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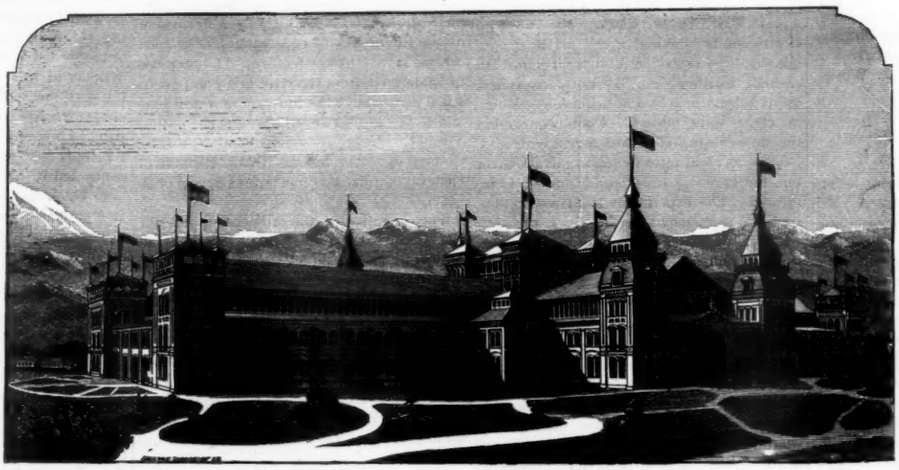
Denver Mining and Industrial Exposition.

The Denver Mining and Industrial Exposition opened on July 17th under auspicious circumstances, with a speech from Senator Warner Miller, and has been running successfully since the beginning. Of the exposition buildings, which we illustrate, the management state in their prospectus: The grounds owned by the Exposition Association comprise forty acres, and contain a sufficient elevation to command an excellent and unobstructed view of the Rocky Mountains. The grounds are surrounded by two rows of shade trees, and in the vicinity of the building are several parterres containing plants, illustrating the beautiful flora of Colorado. The botanist will find, on the east and west fronts of the building, a splendid collection of cactus from New Mexico. The grounds front on Broadway, one of the finest drives in the vicinity of Denver, where the admirer of horse flesh can speed along for ten miles beyond the exposition on a perfect and natural macadamized road. The buildings occupy about seven acres on the rear portion of the company's grounds, and a broad and pleasant walk leads the visitor from the front entrance. The rear entrance to the grounds is from Kansas avenue, where the passenger coaches of standard gauge trains of the East, and narrow gauge trains of the mountain roads, land passengers within 65 yards of the building; this entrance is the one principally used.

Parties in carriages, omnibusses, and all other vehicles, will find an entrance on Virginia avenue, the northern boundary of the grounds, specially provided for this purpose, where visitors are landed within 75 feet of the north nave of the building, at the gate of a corral, which has been fenced from the main grounds in order to prevent accident to pedestrians, especially ladies and children. Vehicles are not permitted to enter the grounds, except within the corral fence, where sheds have been erected for the protection of animals and vehicles.



DENVER MINING AND INDUSTRIAL EXPOSITION.

THE MAIN BUILDING

is a substantial, permanent structure of brick, in the form of a cruciform, 500 feet in length, north and south, by 310 feet 6 inches in width, east and west. The north and south naves are each 192 feet long by 111 feet in width, and the transept, east and west, each 112 feet long by 111 feet in width. The rotunda, seventy by seventy feet, is occupied by a fountain, decorated with mountain ferns and grasses from the cliffs and canons of Colorado. There are four entrances to the ground floor of the main building, flanked on each side by rooms occupied by the officers of the association, the police department, the baggage, check, and ladies' retiring room, and rooms suitable for commissioners' meeting rooms and press headquarters. The north nave and east and west transepts have been set apart as mineral halls, and will contain the mineral and geological exhibit of the exposition of 1883. The south nave will be devoted to the exhibit of machinery, and will contain every kind of machinery in operation, except such machinery as, from its noise and dust, hereinafter provided, will be furnished with space in machinery annex. The floor space of the main building, with its towers and angles, contains nearly 100,000 square feet of space.

THE GALLERIES,

containing nearly 50,000 square feet of space, have nine approaches (eight stairways and the elevator) from the ground floor. The galleries are 27 feet wide, and form a continuous walk 1,500 feet; the space between posts allotted to exhibits being 14 by 20 feet, leaving a walk six feet wide for visitors. The view of mineral and machinery hall from the promenade in the galleries cannot be surpassed in any exposition building in the Union. The gallery space will be devoted to the exhibits of textile fabrics, household goods, watches, jewelry, ornamental articles, liberal arts, natural science, food preparations and articles used in domestic economy. On the gallery floor are eight rooms which can be used for special exhibits or committee rooms.

ART HALL

is located on the gallery floor, at the intersection of the north nave and east transept, and furnishes abundant space, with careful coloring and shading, for the display of the finest paintings, engravings and statuary. The exhibit in this department at the exposition of 1882 was valued at $200,000. The space is divided into three rooms, one 46 by 46 feet, and two 16 by 19 feet each.

THE DOME,

from which a view may be had of the Rockies, stretching away and visible for nearly three hundred miles, north and south, and where the various peaks—Pike's, Long's, Gray's, Arapahoe, James' and hundreds of others—may be viewed, is 80 feet from the ground, and accessible by two flights of stairs and a fine Hale hydraulic elevator. The dome is surrounded by a broad shady walk, protected by railing, and in addition to the view of mountain scenery, the city of Denver with the surrounding country for miles away presents a charming scene of which the eye will never tire. In addition to the view from the dome, there are eight observatories, 70 feet from the ground, surmounting the eight towers, flanking the entrances to the exposition, and these points of observation are accessible by stairs with a sufficient number of landings to make the ascent pleasent to ladies and children.

DRIVING POWER, MOTIVE POWER AND SHAFTING.

The large 250 H. P. Corliss engine, manufactured expressly for exhibit at the exposition of 1882 by Messrs. Fraser & Chalmers, Fulton and Union streets, Chicago, Ills., will remain in position and furnish power to drive all shafting in machinery hall of the main building. An engine of Denver manufacture will furnish power to operate machinery in annex building. In machinery hall of main building there are two lines of shafting, one east and one on west side, each line 139 feet in length, with 3 inch diameter, and having a velocity of 170 revolutions per minute. The line of shafting in the annex building is 137 feet long, 3 inches in diameter, and with an 80 H. P. engine will have a velocity of 170 revolutions per minute.

Shafting and steam power will be furnished gratuitously to exhibitors of machinery in motion. Countershafts,

TELEGRAPH, TELEPHONE AND POST-OFFICE.

The Western Union Telegraph Company have an office in the main building. A post-office has been provided for the delivery and dispatch of letters, and telephone communication over the exposition line is also established with all parts of the city.

The exposition closes on September 30, and it is not too much to say that the unparalleled success of the first exposition of this association, held in Denver, and the bright prospects for the present year, with the special attractions to come later in the season, will certainly attract a larger number of exhibitors and visitors than during the season of 1882. The Board of Directors have perfected arrangements with nearly all lines of railroad and express companies, and favorable inducements are offered in reduced freight and passenger rates.

Mr. Clinton Rice, of El Paso, Texas, a gentleman distinguished as a student and writer, and having many years' experience as a mining solicitor and broker, having tendered his services to the management, has been appointed General Agent of the exposition, and will spend three months in Europe organizing exhibits.

The opportunity afforded inventors of electrical mining appliances and manufacturers of improved mining machinery to come in direct contact with practical workers of mines in the great mineral belt, cannot be excelled, as every mineral-producing State and Territory will be represented.

Those in the electrical fields, as inventors of the electric light and power companies, cannot pay too much attention to this exhibition as a new field for operation, for sooner or later both the electric light and dynamic power will take their place in a safe and economic quantity in mining.

Increasing Telephone Facilities.

General manager H. B. Lytle, of the Chesapeake and Potomac Telephone Company, under whose charge the Telephone Despatch Company, of Boston, has achieved decided success, is in Baltimore. He assumed the management of the company's property there. A large amount of new construction is to be begun at once. Trunk lines connecting Frederick, Hagerstown, Cumberland and Annapolis are to be built. The new wire just completed to Washington is working satisfactorily, and another wire will be completed in a day or two. More business is offered now than can be well accommodated with the present facilities, but they will be increased to finally meet all demands.

There has been no change made in the management of the local company. A new office has been created—that of superintendent of construction for the Chesapeake and Potomac Telephone Company. The incumbent is Mr. J. A. McCoy. Including managers, superintendents, clerks, operators and linemen, there are about seventy-five persons in the direct employ of the company here, whose offices are in the *American* building. Thirty-three of the operators are young ladies. The service has been in recent months generally effective, though there have been every now and then some complaints. The subscribers to the exchange number nearly twelve hundred.

A Difference of Latitude.

A Rio Janeiro gas company is in difficulty over a report published in the Brazilian *official* organ of the State. The controversy arose over the publication of the report of the public inspector of illumination, which differs from that of the gas company. In the address to the Minister of the Department the manager of the company makes an humble appeal which is interesting as a comparison with tactics pursued in this latitude.

"Most Illustrious and Excellent Sir :

"Having seen in the *Diario Official* of the 19th inst. that your Ex. stated in the Senate that the clauses of the notice inviting tenders for lighting this city by gas were undergoing a careful examination, and that, in such points as you considered that the public weal and the need for being in harmony with the intention of the legislator, as promulgated in the law of the budget now in force demanded, you purposed to duly modify such clauses, and in your opinion it was expedient that the time fixed for receiving tenders should be at once extended, I beg that your Ex. will permit me—as much in the interests of truth as in those of assisting to carry out the views of the imperial government—to call your attention to certain data regarding the production and consumption of gas, first published in the *Diario Official* of the 2d May last, to serve as a basis for such as may wish to tender for the new gas contract."

And concludes as follows :

"God keep your Ex. Ill. and Ex. Cons. Affonso Augusto Moreira Penna, Minister and Secretary of State for the Department of Agriculture, Commerce, and Public Works, etc., etc., etc.

J. Owen Unwin,
Acting Manager.

"Rio de Janeiro, 28th June, 1883."

Had this occurred in this country before the age of electric lighting, the "A. M." would have written a communication something like the following :

"Sir : Your ill-natured speech, full of insinuating insults has been read by a subordinate in our employ, who reported enough of the facts to our company to justify us in saying that your ignorance of this subject is only equaled by your intense lying proclivities, which will soon place you upon the retired list of blackguards and cesspool politicians. We have taken steps to have your infectious carcass removed from the position you now disgrace, and shall only be content when we have proved to the whole world that your department is rotten to the core, and overcrowded by blackmailers and bribe-takers, of which you are the chief 'blood-sucker.' We have stopped the cowardly sheet that published your harangue, and discharged the person who had the indecency to show us the article.

Yours, &c.,

A. M."

A New Mechanical Law.

Mr. Edward Bromiley, a young machinist and pattern-maker who resides with his family in a modest little dwelling at Frankford, claims to have discovered a new mechanical law, the application of which will enable him to increase a hundredfold the power of any machine, from a clock to a steamship, without using an ounce more fuel than usual or driving the motive power any faster than ordinarily.

Hitherto both theoretical and practical mechanics have contended that it was an impossibility to invent a machine that would multiply the power of an engine or motor, but Mr. Bromiley claims most emphatically that he has solved this problem, and that by applying the new law of mechanics which he has discovered the multiplication of power becomes an accomplished fact.

Mr. Bromiley, who works at his trade in the factory of the Bridesburg Manufacturing Company, was seen at his residence last night by a *Record* reporter. He said: "I am sure that I have really discovered a new mechanical law, and that its application will be the greatest possible success. I have been an inventor and practical machinist since I was a boy, and first made this discovery about four years ago, but only in the last six months have I been able to apply it successfully." In reply to a question as to the nature of the law, Mr. Bromiley said that at this time he could not disclose it, but that its application consisted in combining the action of the screw, the inclined plane, and one other form which he refused to mention, and that the result of this combination was the multiplication of any power applied to it. He has a model almost completed, with which he says he can in an hour prove the truth of his claim to any practical machinist. Like many other inventors, Mr. Bromiley has reaped but little fortune from the success of his devices. He invented the pulsometer pump, and the system of brakes now used on the freight cars of the Pennsylvania Railroad Company, but in both instances was made to suffer by getting into the hands of unscrupulous patent lawyers, who managed to capture the oysters of his inventions, leaving him only the shell. He is extremely cautious in regard to his new and great discovery, and says that if any sharpers get the best of him it will be entirely his own fault.—*Philadelphia Record.*

A Liquid Voltaic Cell.

In the ordinary voltaic element two solid plates are acted on unequally by one or more liquids. Mr. F. W. Clarke, an American electrician, has devised a cell of three non-mixable liquid strata, and no solid plates. In a small weather-glass layers of mercury, dilute sulphuric acid, and a solution of iodine in ether were placed. Upon connecting the uppermost and lowest layers with insulated wires, and introducing a galvanometer into the circuit, a considerable current is indicated. The experiment is interesting, but such an arraugement is hardly a practical battery. Under certain conditions, however, it might yield a constant electro-motive force. —*Engineering.*

The balloon in which the Count de Dion and M. Rembieleusky recently made an ascension from Paris presented several novel features of great interest and value to the study of ærial navigation. The scientific instruments are of the finest quality, and comprise a hygrometer for the measurement of the moisture or dryness of the atmosphere, a psychrometer for measuring the tension of aqueous vapor, an aneroid barometer and an extremely sensitive metallic thermometer.

The scientific equipment of the balloon was completed by some beautiful little electric lights, with their complement of charged batteries, among them being a tiny electric bull's-eye lantern, the rays of which could be directed up on the balloon and search out any weak spot which might require attention.

Suit has been begun in the United States Circuit Court at Cleveland, by Charles F. Brush and the Brush Electric Light Company against George B. Senter and W. H. Boulton, copartners under the firm name of the Boulton Carbon Company, for infringement of patents held by the plaintiffs. The plaintiffs represent in their petition that three patents were obtained by Mr. Charles F. Brush, one on the carbon rod or stick, used in the electric light, and the mechanism for making the same; one on a process for baking carbon rods, and one on a process and apparatus for straightening carbon rods. The right to manufacture and prepare carbon rods under these patents was given to the Brush Electric Company by Charles F. Brush, the inventor, on the payment of a royalty to him by the Brush company, and such right has been given to no other person or company, but the plaintiffs claim that the Boulton Carbon Company has been infringing upon these patents and illegally carrying on such manufacture by the process invented by Mr. Brush. They therefore ask that the defendants be enjoined from the construction, sale, or use in any manner of these patented improvements, that they be compelled to account for the profits or income derived from the construction, sale, and use of such process that they have carried on in the past, and pay the plaintiffs damages on account thereof. The usual list of interrogatives following petitions in patent cases, which must be answered by the defendants, is attached to the petition.

A Selenium Arc Lamp Regulator.

It is well known that in the ordinary Jablochkoff candle the position of the arc sinks as the candle burns down. M. Tomasi has recently invented a device for correcting this. He employs a selenium cell on which the light of the arc is focussed by a reflector. When the light sinks, the cell is unaffected and the current passing through it fails in strength owing to the increased resistance of the selenium. This current operates a relay which closes a local circuit in which is placed an electro-magnet. The relay opens the local circuit when the selenium cell rises in resistance, and the armature of the electro-magnet in the local circuit liberates the candle from a detent which held it fast. The candle being mounted on a spiral spring in its socket thereupon rises up by the pressure of the spring until the arc returns to its old focus and the selenium cell again operates to close the relay circuit and hold the candle.

Electric Power in Switzerland.

Engineering (England) says that the city of Geneva is about to utilize the water-power of the Rhône for the construction of a great central motive power factory. The power is to be derived from the river at a point about 1,000 yards above the junction of the Rhône and Arve, and between there and the mill of Vernier. Powers are solicited from the Swiss Council of State by the Town Council of Geneva to utilize this power for a period of 99 years.

The execution of [the project will put the city of Gevena in possession of several thousands of horse-power cheap; it will develop the water service and permit the lighting of the town by electricity. The Geneva State will undertake not to authorize any opposition scheme. The water-power will be utilized by means of a dam across the river, furnished with discharge ways for flood waters. Turbines will be erected on the right bank of the river, and will be capable of utilizing a minimum volume of 120 cubic meters per second with a fall of 4 meters.

Speed of Explosives.

M. Berthelot has been investigating the speed with which explosive phenomena are propagated in gases. For this purpose he filled, with the explosive mixture of oxygen and hydrogen, carbonic oxide and oxygen under atmospheric pressure, an iron tube about sixteen inches long and a third of an inch in bore, so arranged that the passage of an explosive could be accurately registered at a point close to where the spark was applied, at the middle and at the farther end of the tube.

The experiment showed the speed of propagation to be about twenty-five hundred meters, 8,125 feet, a second. But these results should not be regarded as furnishing the absolute value of the speed of the explosive force, for the quantities measured are too small for that; but they at least give an indication that the speed is much greater than had been supposed.

Bunsen, for example, in 1867, had estimated it at thirty-four meters a second for detonating gas, and one meter for carbonic oxide mixed with oxygen.

The rapid propagation of explosive phenomena appears to be due to the transmission of the successive shocks of the gaseous molecules which have been brought into a vibratory condition more intense than the heat disengaged in their combination.

The phenomena of explosives are then more complex than a simple movement of transmission, or even than the propagation of a sonorous wave.

The Jenney Arc Light.

An arc lamp, new to New England, has lately been shown at Middleboro, Mass., by the inventor, J. A. Jenney, of Indiana. Mr. Jenney is a native of Middleboro, but has for many years resided in the West, and being of an inventive turn of mind and a good mechanic, has for some time given exclusive attention to the elaboration of a system of electric lighting, finally organizing the Fort Wayne Jenney Electric Light Company. Plants have been started and companies formed at several points in Indiana, Ohio and Illinois, and Mr. Jenney has left his son, C. D. Jenney, who has always taken a lively interest in the system, to take charge of the electrical work, and will make an effort to introduce the light in Massachusetts. A brief description of the generator and lamp will therefore prove of interest.

The dynamo is said by Mr. Jenney to be so closely patterned after the Pacinotté machine as not to infringe the Gramme patents. In its general appearance it closely resembles the Von Hefner Alteneck generator of about 1873 (though it does not embody the peculiarities of that eccentric machine), and in the relative position of its working parts that of the new Heinrich's dynamo. An idea of its special features may be secured by Fig. 1. To the massive iron frame, *A, A*, are attached the four horizontal field coils, wound with No. 7, 8 or 9 wire, according to proposed capacity, their pole pieces, *B, B*, being arched to partially enclose the armature *C*, and furnish by rounded extensions, *D, D*, a substantial socket for a brass bearing supporting one end of its axis. The armature itself has for its core an elongated cylinder of iron wire *E*, Fig. 2, supported on the shaft by spokes, and wound longitudinally with No. 12 to 14 wire, according to size and amount of work to be done in the six light machines, divided into 64 coils, connected with each other and the commutator blocks as in the Gramme ring, as shown at *F* and *G*. The main peculiarity of this generator lies in the arrangement of its field cores, there being but two joints in the framework, and those at the points of magnetic neutrality, *X* and *Y* (Fig. 1). The cores of the four coils, with their end supports, thus form a magnetic circle similar in effect to two steel horse-shoe magnets, having like poles in conjunction, or as if two magnets thus placed formed an ellipse. This result, as Mr. Jenney explains, is attained by the use of the familiar principle that a soft iron bar wound for half its length in one direction, then reversed for the remainder of the distance, give between the two coils a third magnetic pole of opposite sign to the two like poles at its end. By thus "winding for consequent points," the inventor claims increased intensity of the magnetic field of the machine, and ability to secure 1.3 lamps of 2,000 candles each per indicated horse-power. The coils are in series, and form a part of the direct circuit, exterior relative to the armature. The revolutions of the latter, on its long and substantial bearings, maintains a current of air over its surface and through its hollow cylinder, and very little heat, which may be produced, remains to prove a disadvantage to its work. The commutator, placed between one of the bearings and the armature coils, is built up of the ordinary segments and insulating strips of wood fiber, confined by the pressure of clamping bolts between opposite non-conducting faces. The brushes are superposed copper strips, 1½ inches wide and not toothed. They are carried by an adjustable lever pivoted on the shaft just inside the bearing, allowing the shifting of their positions to modify the electro-motive force, the large number of sections allowing of a nice adjustment. Closely associated is a regulator, or more properly an indicator, consisting of a low-resistance hollow coil, its wire of an even size with that of the field coils in the main circuit. From one end of a curved lever, pivoted midway, hangs a core within the coil, balanced by a spiral spring at the other end. An extension of this lever vibrates as a needle on the face of a dial outside the box in which all is enclosed. Any variation in the resistance of the outside

circuit, caused by the introduction of lamps or turning out of those in use, causes a weakening or strengthening of the attractive power of the solenoid and a deflection of the needle on the dial, notifying the attendant that a disturbance, accompanied, of course, with brightening or weakening, flashing or flickering, has taken place, and admonishing him to shift the point at which the brushes touch the commutator. This is the arrangement, and with the always tardy aid of the attendant accomplishes what is done automatically by the Thomson-Houston regulator, with the important difference that the Jenney indicator shows that changes and consequent disturbances have occurred, while the other is sensitive to the slightest current variation, and forestalls its derogatory effects by instantaneous compensating action. A small, single-bottom switch on the base enables the attendant to short-circuit the field coils at will by a path of no resistance, and, by instantly depriving them of their attractive power, prevent sparking when the machine is disconnected, if desirable, at full speed. The dynamos are built in sizes for 2, 6, 8, 10, 15 and 20 lamps, and are driven at a rate varying in the different sizes from 1,000 to 800 revolutions per minute.

The form of the lamp has no especial features by which it may be distinguished. A circular sheet-iron case contains the regulating mechanism which is simple and effective, and may be easily understood by reference to Fig. 3.

The current enters the lamp at the screw-cup *P*, and divides between the pair of high-resistance magnet coils *A* and a pair of low-resistance *B*. These latter are, of course, traversed by the greater portion, which passes through the upper carbon *G*, the arc, and the negative carbon below, reuniting with the shunt circuit and connecting to line at *Q*. Between the poles of *A* and suspended from the double lever *E* which is pivoted at *I*, is a leaden weight *K*, in its turn connected with one arm of the right-angled lever *L*, in the angle of which is mounted a small wheel *F*, the other arm being pivoted to the frame of the lamp at *M*. The wheel normally binds the upper carbon holder in its socket. As the carbons burn away, however, and the arc increases in resistance, a greater proportion of the current flows through *A*, and its armature *C* is more powerfully attracted allowing *K* to fall slightly, and *F* to loosen its grasp upon the carbon which feeds by gravity. From one end of the double lever *E* extends upwards through the top of the lamp a spiral spring and set screw *O*, by which the weight *K* is balanced.

At *J* an insulated point is placed in direct connection with the entering wire, while just below it another point *N*, on the armature lever, attaches to the other pole of the lamp. If by any accident the lamp should be broken *B* would lose its attractive force entirely, and *A* would draw *C* down until *J* and *N* were brought in contact, including in their circuit the compensating resistance coil *R*. At the top of the frame an ordinary switch shunts the lamp from the circuit whenever desirable. A glycerine dashpot *S* prevents any too sudden movement of the armature and carbon-holder.

Your correspondent has been unfortunate in failing to gain any definite figures as to the electrical efficiency of this system.

Mr. Jenney seems to have forgotten the resistance of the generator and lamp, has mislaid his memorandum regarding the division of current in the differential magnets, and does not think that any test of the E. M. F. of his generators of the current required per lamp or any photometric measurement of its light has ever been made. His 6-light dynamo was placed in connection with a Baxter engine in a Middleboro machine shop, and a temporary circuit of ¼ mile, including four lamps, was operated on two evenings for about an hour on each occasion. The engine furnished 6-horse power, and was taxed to its utmost capacity to secure the requisite energy and speed. No electrical experts were present from other places, but the light is generally spoken of as steady and satisfactory.

The following extraordinary statement will be of interest to all your intelligent readers—it is from the Middleboro *Gazette*, and alludes to these experiments or demonstrations:

"At the first test Friday evening no electricity was produced. This result was attributed by Mr. Jenney to a disarrangement of the polarity occasioned by crossing the magnetic meridian in the transportation of the machine [from Fort Wayne.] By the application of a small battery it was readily restored to its normal condition."

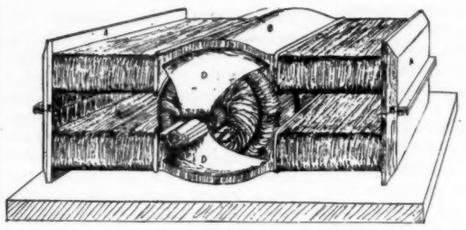


FIG. 1.

One or two other claims made by Mr. Jenney through the same paper may also be interesting.

"The quality of the light is far superior to that produced by any other electric machines now in use, in its steadiness and pure whiteness, being devoid of the blue color or lightning-like appearance. This result is obtained by the degree of tension peculiar to the

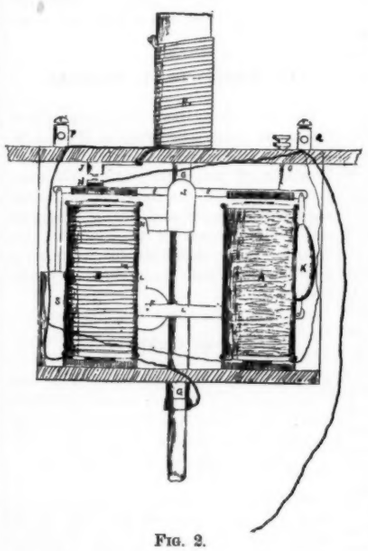


FIG. 2.

electric current produced. * * * The Jenney dynamo is more durable and less complicated than any other yet built. * * * Mr. Jenney is confident he can furnish this light for from 2 to 3 cents an hour per lamp. * * * The effect of exhibiting the Jenney electric light in this village has been to induce the business men of the central portion of the town to subscribe their names for the probable formation of a company using the 60-horse power privilege at the shovel works dam, the cost

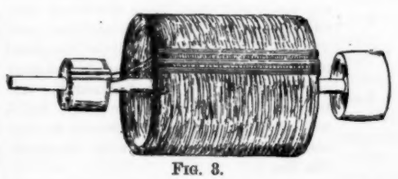


FIG. 3.

of twenty lights being rated at $1 per week per lamp."

Since the publication of these items Mr. Jenney has visited the rising young city of Brockton, which is as yet without electric lights, though eagerly looking now for the starting of the proposed Edison system, and guaranteed to supply his lamps to consumers there at $1.20 per week.

It might be possible in Middleboro, where the expense of water-power is so trifling that it may practically be overlooked, thus to pay expenses. Other arc systems have, however, figured the maintenance of a 20-light circuit about as follows:

Interest on plant (say $4,500) at 7 per cent. per week	$6
Depreciation—2½ per cent. per annum per week	2
Labor—Engineer (at least) per week	6
Carbons and attendance	9
Total without reckoning power	$23

Taking the total receipts of such a system at $20 per week, or for Brockton where power costs from $50 to $100 per horse-power per year ($24 per week), the figures given by Mr. Jenney will doubtless excite a deep interest in the outcome of his New England experiments.

RAMBLER.

Taunton, Mass., July 10, 1883.

Referring to the telegraph strike the *Evening Post* says:

The attempt to make the railroad operators join the strike is now an admitted failure, and must hasten the termination of the struggle. Another sign of its near approach is the increased cutting of the wires of the Western Union. The head men of the Brotherhood maintain that this is undoubtedly done by the company itself, a sapient suggestion which receives a sort of endorsement from the New York *Times*, which seems determined to be thorough in this matter. It reminds one, however, a little too much of the suggestion of the Land-Leaguers that the Irish murders were committed by the police in order to bring discredit on the organization. We do not believe the Brotherhood either encourages or connives at any outrage, but in every strike there are plenty of men ready for outrage when they begin to grow desperate—a fact so familiar as to make the charge against the Western Union of damaging its own property tolerably silly.

The theory that the company ought to pay higher wages, and admit the Council of the Brotherhood to a share in its control of its subordinates, because the managers are wicked men who have watered their stock, bears strong marks of having originated in some nursery, but it is none the less a theory which is very likely to dispose evil-minded strikers to mischief. Strikes may be a good or the only possible mode in many cases of ascertaining the real market rate of wages (which in most trades settles all other differences), but whenever they are set on foot for any such purpose, care should be taken by all concerned not to rob them of their purely commercial character, or convert them into a moral or religious crusade. In the present instance, as in the freight-handlers' strike, it was seriously proposed to harass the employers through the courts, and compel them to accede to the strikers' demands through fear of legal penalties, simply because the managers of the Western Union are odious men, who have at other times and in other matters behaved badly. But, as we said the other day, if all the bad men—or men of whom the public does not approve—had to pay more wages than their neighbors by way of atoning for their badness, the business world would soon find itself in a pretty mess. Suppose the newspaper offices, or the brokers' offices, or the wholesale clothing stores were invaded by this doctrine, and employers were furiously urged to give all their clerks, printers, and other employers 30 per cent. advance because of their tricky course on one occasion, or their sharp dealing or unscrupulousness on another, what would the sane part of the community say to it?

The present strike will do much good if it calls the attention of the public to the fact that the enormous number of persons employed by modern corporations, and the relations of some of them to the public, put strikes out of the question as a mode of adjusting their differences with their servants. Whether such strikes are prohibited by law or not makes no difference. No great corporation can allow them to succeed, on pain of ruin. The 10,000 to 40,000 men which some of our modern corporations now employ in telegraphic or railroad service are an army, and have to be governed on the same principles as an army, and the fundamental principle of army management is that there can be no division of authority, and that nothing, however reasonable, can be yielded to dictation. No company can suffer itself to be threatened into a change in its arrangements by its subordinates, or admit outsiders into a share in the control of them without seeing its service eventually go to pieces. Doubtless this often works injustice and hardship, but it is essential to the government of large bodies of men, and this government of large bodies of men in industrial organizations, let us add, is a recent phenomenon, to which it is absurd to try to apply rules derived from the petty disputes of factories or workshops employing a few dozen or a few hundred hands.

For whatever is wrong in corporate management the remedy is to be found in careful legislation and not in egging on employes to strike.

There is no manager of a corporation who knows his business and is fit for his place, who will not sooner loose millions in resisting a strike than save them by yielding to one, because he knows well that the first concession made to threats means the loss of control over his own business.

In some trades the domination of the trades unions over the employer keeps him constantly on the verge of ruin.

The extension of the system to the railroads and telegraph lines would be in the end the greatest blow American industry has ever received, and would be fraught with endless financial confusion. A trades union council, composed usually of irresponsible and often ignorant and unscrupulous men, would at any moment be able to precipitate a financial crisis by making sudden and unreasonable demands on corporations, and calling for a quick answer. If the conclusion is deliberately reached by the public, that the servants of corporations are unable to take care of themselves or make their own contracts, the proper way for protecting them is to establish boards of arbitration, whose decisions would be binding on both parties—on the company by leaving it open to actions for damages in case of non-performance of business it proposes to do; and on the employees by releasing the company from all such liability in consequence of non-compliance with their demands. But the difficulty in the way of such legislation is, and always will be, the sympathy of all business men with anybody who is prevented by law from managing his business in his own way, and above all, from fixing the rate of wages he can afford to pay. Whenever wages begin to be fixed by Government boards, every employer of labor in the country will quake in his boots.

A competition trial of the three most prominent systems of arc-lighting, viz.: the Brush, the Weston, and the Thomson-Houston, was made last February at Quincy, Ills, and a committee consisting of the Mayor of Quincy, the Common Council, and twelve prominent citizens, "upon due investigation as to the merits of simplicity of machinery and lamps, steadiness of light, color of light, and amount of light," gave the highest award to the Thomson-Houston apparatus, made at New Britain, Conn. As a sequel to this trial, the city of Quincy has now given a contract to the Thomson-Houston Electric Company for lighting a considerable portion of the streets of the city.

A Remarkable Hydraulic Feat.

ELEVEN HUNDRED HORSE-POWER FOR AN ELECTRIC LIGHT PLANT—THE BRUSH COMPANY USE THE VICTOR TURBINE WATER WHEELS IN THEIR WORKS AT ROCHESTER.

In our last issue we gave an extended account of the Brush enterprise at Rochester, N. Y. There seems to be but little to add to what has already been said, still, many of our readers, and especially those interested in the subject of successful electric lighting, will read this article, first published in the *Milling World*, with interest. There is something of a new departure in the equipment of this plant, and we shall watch the outcome closely and place the facts before our readers at an early date.

"These works are located on the west bank of the Genesee river, at what is styled 'the lower falls,' within the city of Rochester, N. Y., and they derive their motive power from the waters of that river They are intended for generating electricity for lighting purposes in the city of Rochester and vicinity. They consist of a brick superstructural building or house, 100 feet long by 50 feet wide, and one story high, resting upon and supported by substantial substructural walls and piers of stone and brick, of various heights and forms, and substantially based upon prepared foundations at various levels in the solid rock.

"Fig. 1 is a cross sectional elevation through the wheel and gear pit, as viewed from the north or down stream end. Fig. 2 is a longitudinal section from the bottom of the wheel pit upward, as viewed from the west or land side of the works.

"The superstructure is spanned across its width at the base of the roof, with nine trussed girders which support the roof and the line shafting with its leading wooden-rimmed band wheel, 5 feet diameter by 4 feet 8 inch face, and 18 pairs of fast and loose wood-rimmed pulleys, 42 inch diameter by 13 inch face each, making 360 revolutions per minute, and connecting by 12-inch belts with eighteen electro-dynamic machines arranged upon the floor near either side of the building, as shown in Fig. 1, giving them 756 revolutions per minute, at an expense of 40 horse-power each, making a total of 720 horse-power, supporting 720 lights, equal to 40 lights per machine, or one light per horse-power. The magnitude of the lights is not stated. In Fig. 2 is a side elevation of one of the machines. The fast and loose pulleys which drive the dynamos, were furnished by the Taper Sleeve Pulley Works, of Erie. Pa., and they are so constructed and arranged that by one single and gradual movement of a double-headed oscillating cam, in connection with a belt shifter, the loose pulley which hangs on a hollow independent bearing (not shown in the cut) concentric with and surrounding the shaft without contact therewith, is thrown into gear and set in motion, so that as the cam is continuously moved forward through the extent of its parallel arc which holds the loose pulley in gear, the belt is shifted on to it, when, by a little further movement of the cam, its inclined part at the rear end disengages the clutch, and the loose pulley, together with the belt and the actuated machines cease moving and remain idle, until the cam is moved in the reverse direction, setting the idler in motion, shifting the belt into working position and setting the machine in motion, when by the inclined part of the opposite end of the cam from that aforementioned, the clutch is disengaged and the idler is again at rest, out of contact with any of the running parts.

"It is in contemplation to add nine more electric machines in this same building, to be driven by the same power, should time and circumstance demand it, making 27 in all, producing 1,080 lights and requiring 1,080 horse-power. The power is to be obtained by the use of two Victor turbine water wheels, 20 inches in diameter, made by the Stilwell & Bierce Mfg. Co., Dayton, Ohio. This wheel is noted for the extraordinary power developed by it, in proportion to its diameter, while at the same time the percentage of power in proportion to water expended (according to tests made at the Holyoke testing flume), ranks it among the highest and best.

"Another advantage possessed by this wheel is that its comparatively small diameter for a given power, causes it to revolve so rapidly as to make a considerable saving in the cost of shafting and gearing.

"The situation and surroundings of the water wheels and their appurtenances in this case, are indeed unique and extraordinary, and indicate a perspicacity of discernment, acuteness of conception, boldness of design and thoroughness of execution on the part of the projector, that stamps him at once as eminently qualified to place and execute a work like this, environed as it is by great natural obstacles and serious practical difficulties. To make a proper place for the flume or forebay, an open recess or bay was cut into the upper rock bank about 32 feet horizontal depth by 20 feet wide and 36 feet perpendicular depth, down to a level with the bottom of the head race. The bottom of this bay is about 45 feet below the floor of the superstructure, and extends under it about 28 feet. From the bottom of this recess at its back side, is a shaft about 12 feet square, sunk perpendicularly into the rock to a depth of about 90 feet, to a point some four or five feet below the surface of the back water from the river below the falls, which are nearly 100 feet high, as will be seen by the cuts. From this shaft a culvert extending about 36 feet in height from the bottom of the shaft, is cut through the rock out to the river, as shown in cuts. Between the top of this opening or doorway, and the bottom of the race and forebay, is about 55 feet vertical thickness of rock, as shown in cuts, being represented in section in figure 1. On the bottom of said recess in the rock, and partly over the shaft therein, is the flume, containing two U shaped iron forebays, *A A*, seven feet high, opening toward the head race, and from the bottom of which are suspended two iron stand pipes, *B B*, 76 feet and 10 inches long by 42½ inches in diameter, their upper ends opening into the forebays to receive water to supply the wheels. At one side of each stand pipe, and connected thereto with a short cylindrical tube, is an iron wheel case *C*, with a draft tube attached to its bottom, and extending some ten feet downward, and entering the back water. One wheel case in each figure is partly broken away, to show the wheels. Besides the support to the stand pipes by their connection with the iron forebays, *A A*, they and the wheel cases, *C C*, are supported at their bottoms by iron beams, as shown in cuts. The turbines are placed in the wheel cases *C*, and each one has about 58 feet of steel shafting, 3½ inches in diameter, coupled to it and supported by bracket bearings projecting from the stand pipes, *B B*. Each of said shafts has on it, near its top end, a spur pinion 21¾ inches in diameter by 17 inch face, 17 teeth, 4 inch pitch, machine dressed These gear into a core spur wheel 69½ inches in diameter, having 54 wooden cogs, and which is hung on near the bottom of a steel countershaft 6 inches in diameter and 60 feet long, on which, near its top end, is a bevel wheel 88 inches in diameter, 18 inch face, 55 teeth, 5 inch pitch, gearing into a core bevel wheel, 99.6 inches in diameter, with 56 wooden cogs, 18 inches wide. This wheel is on a short, horizontal shaft, 6 inches in diameter, having on its farther end, beneath the floor of the building, an iron spider carrying a wooden-rim band wheel, 10 feet in diameter by 4 feet 8 inch face, carrying a rubber belt 4 feet 6 inches wide, by ⅜ inch thick, which connects with the heretofore described five-foot leading band wheel on the main line of shafting above, and drives them.

"The turbines operate under 94 feet head of water, including the 10 foot draft tubes, and are estimated to make 582 revolutions per minute, and develop 572 H. P. each, which, combined, equals 1,144 horse-power. The counter upright shaft makes 188.22 revolutions per minute, the counter horizontal shaft, with the ten foot band wheel, 179.95 revolutions per minute, the main line shaft about 359.9 revolutions per minute, and the electro-dynamos 755.79 revolutions per minute."

The Victor turbine water wheels are manufactured by the Stillwell & Bierce M'f'g Co. of Dayton, Ohio.

Underground Wires.

Joseph B. Ecclesine, Jr., William S. Taylor, and H. Stevenson Beattie of this city, and William H. Johnstone of Philadelphia have filed in the County Clerk's office a certificate of incorporation of the New York Sectional Electric Underground Company. The proposed capital stock of the company is $2,500,000. At the offices, at 15 Cortlandt street, it was said yesterday that permission to open the streets for the laying of the wires had not yet been obtained, but it was thought that it could be obtained without any great trouble. It was also said that the company preferred to say nothing of its plans for the present. The proposed general route of the line of telegraph of the company is from the junction of Broad and Front streets, north through Broad street to Wall street, through Nassau street to Chatham street, to the Bowery, to Fourth avenue, to Seventeenth street, to Broadway, to Thirty-fourth street, up Sixth avenue to Fifty-eighth street, to Ninth avenue, to 110th street, to Eighth avenue, and to the Harlem river at McComb's Dam. In adddition, it is proposed to have branches, parallel routes, and cross lines in most of the principal streets and avenues.

The Wooley Electric Headlight.

The Ohio Power and Light Company of Dayton, O., have transferred to Herman H. Fulton, Indianapolis; George N. Wheeler, President of the National Bank, Denver, Col., and others, the right to manufacture and introduce in Indiana, Illinois, Wisconsin and Kentucky, and all territory west, the Wooley Electric Headlight, claimed to be the most successful light for locomotives yet introduced.

Tame Lightning.

AS HARNESSED TO MEN'S AFFAIRS AT THE TELEPHONE—A WEB OF WIRES EXTENDING OVER THE STATE, AND ALL OF OUR INLAND CITIES BEING STRUNG UPON THEM—THE TELEGRAPH MESSENGER SERVICE, ETC.

Ever since the purchase of the telephone lines and instruments in this city by the Great Southern Telephone and Telegraph Company, the new officials have been very active in effecting changes and adding improvements. All their work thus far, however, has been preparatory, for the bulk and most important of the improvements will be added in the course of a few months.

At the present time the company is engaged in pushing forward to rapid completion the lines to Donaldsonville, Plaquemine, Baton Rouge, Napoleonville, and Woodville, Miss., and in the course of three weeks communication between here and Donaldsonville will be open, and that thriving town will then be a district of New Orleans, as far as communication goes. The line to Baton Rouge will be completed in about two months, and as the company are at present pushing forward the line between Woodville and Baton Rouge, which will be working in about a month, through communication can be had with Woodville. The line to

THE UPPER COAST

will cross the river to Algiers, thence run along the river to Donaldsonville (ninety miles) and Baton Rouge (120 miles), taking in intermediate points. The wire used is No. 9 heavy line wire, and all the connections will be perfected and then well soldered. The poles will be of white cedar and the insulation will be as perfect as possible.

The advantages of reliable and rapid communication with the towns and plantations along the Upper Coast will be obvious to all. The charges are moderate, as will be seen by

THE FOLLOWING TARIFF,

which the company have concluded to adopt:

For 5 minutes' conversation with Donaldsonville, 50 cents; with Plaquemine, 55 cents; with Baton Rouge, 60 cents; with Napoleonville, 65 cents.

The minimum of charges for 5 minutes or less of conversation has been decided upon by the company, who have based their calculations on observations as to the average length of telephonic conversation as carried on over the lines; 2½ minutes is the average duration of communications and replies, and the company have doubled the time and fixed the charges as above.

When the lines are completed they will be open not only to subscribers, but to the public in general.

The advantage that subscribers will enjoy is that they can call up the New Orleans Exchange from the place were their instruments are located, and ask to be connected with those of the persons with whom they desire to speak in any of the above named cities.

The New Orleans Exchange rings up, say for instance, the Donaldsonville Exchange and informs them Mr. Jones in this city desires to speak with Mr. Brown in Donaldsonville. The exchange at the latter place connects Mr. Brown with the New Orleans line and the exchange here switches Mr. Jones on the other end. Mr. Brown says "Hello!" and time is taken and the conversation commences and is charged according to the length of time required to correspond, barring accidents by reason of connections or otherwise.

In case non-subscribers desire to communicate with

PARTIES IN OTHER CITIES,

they will be required to pay for the services of a messenger, who will notify the persons with whom they wish to communicate to call at the Exchange at such a time as the first-named party may designate.

The company will ultimately extend this line to Memphis, and in addition to the above towns, Port Hudson, Jackson, La., and Bayou Sara will shortly be in communication with this city.

The wires and instruments in the city are being thoroughly overhauled, and as far as practicable are being transferred from housetops to poles. All those lines, which have already been commenced, will be completed and a number of new ones erected during the winter.

A new line has already been contracted for, and yesterday the intended route was staked out up New Levee street to Louisiana avenue.

A magnificent new switch-board, the finest and largest ever manufactured in this country, destined for this city, is now being made by the Western Electric Telegraph Company of Chicago, and will reach here in about sixty days. A large number of new instruments have also been ordered for new subscribers.

THE COMPANY

is at present officered as follows: E. S. Babcock, Jr., president; P. J. Marrs, vice-president and general manager; E. T. Baker, secretary and treasurer; and W. W. Heuck, manager at New Orleans.

Captain Marrs is at present in the city, and speaks confidently of the success of the new company. He says it is their intention to make the New Orleans Exchange the finest in the South, and the most complete in the country. They have a perpetual contract for all manner of telephone business with the patentees of the American Bell Telephone Company, and will introduce

ALL THE IMPROVEMENTS

that may be made in the future. Captain Marrs is very enthusiastic and sanguine as to the adaptability of the telephone to long-distance communications in the early future, and hinted at inventions at present owned by the company that would soon be placed in use. He anticipated no trouble whatever in the length of the line between New Orleans

and Baton Rouge, although two cables, one here and one at Baton Rouge, would have to be used.

Mr. W. W. Heuck, the local manager of the Telephone Company, is well known here, having been connected with the American District Company as secretary for many years. Mr. Heuck's enterprise and business ability are well known, and no better man could have been selected for the position held by him.

At present the company has twenty-three operators at the exchanges, and eighteen linemen, who are in charge of Louis Niemeyer, chief of the polemen.

A LARGE FORCE

will reach the city on the 1st of September, and the new lines and instruments will be rapidly constructed and placed in position. Six miles of area cables have been ordered and two new submarine cables.

A telephone line from Vicksburg to Yazoo City is now in progress, and the two cities will be connected in a few weeks. The line from Yazoo City to Sartartia is already in working order. Poles for the contemplated line between Vicksburg and Jackson, Miss., were ordered a few days ago, and the line from Shreveport to Belleville was placed in operation last week.

MR. W. H. BOFINGER,

president of the American District Telegraph, still remains at the head of the company. To Mr. Bofinger's untiring zeal and enterprise this city owes its present satisfactory telephonic and messenger service. Mr. Bofinger, when he first conceived the idea, met with many objections and encountered no small difficulties, all of which were surmounted by his administration of affairs. Ever alert and ready to introduce any improvement conducive to the interests of his patrons, or to render the service more efficient, he succeeded in making the American District Telegraph and Telephone Exchange a necessity, and to him is due the popularity which the use of his messengers and telephones have acquired in the past.

There has been a change in the management of the

AMERICAN DISTRICT TELEGRAPH

and messenger service. Mr. W. S. Delaney, who has been connected with the District Telegraph almost since its inception, has been promoted to the General Superintendency, and on the 1st inst. took charge of the office. Under his management the service will be greatly improved, and a number of new features, which are destined soon to be indispensable adjuncts to the messenger service, are in contemplation, with every prospect of early fulfillment. A thoroughly drilled, handsomely uniformed and effective messenger corps are to be employed, and no one of them can aspire to a position until he has been examined in the duties incumbent upon him as messenger. A number of young men, also in uniform, will be employed, and will be used to escort ladies and children to and from places of amusement, schools, etc.

Under Mr. Delaney's management these innovations promise to be successful and come into general use.

Mr. Delaney first entered the service of the company in 1875 as lineman. Acquiring the art of telegraphy, he became manager of the Fourth District office. From there he was transferred to the main office as night manager.

The system of night watch patrol, which of late has become so popular and effective, owes its success in no small degree to Mr. Delaney, who is manager of Farrell's City Protection Patrol; and in his present position as general superintendent will be able to still further add to the efficiency of the patrol.

Mr. James D. Gormley has been assigned to the position of night manager, made vacant by the promotion of Mr. Delaney.

Mr. James McCormack has been retained as night sergeant. These two gentlemen are both diligent and effective officers, and worthy of the trust reposed in them.

An Electric Stroke.

Old General Sablemope was very much annoyed by a young man who persisted in visiting his daughter. "I want to tell you now," said the general one evening, "that you shall not marry my daughter, and that if you ever come here again I'll maul you unmercifully."

"General, you could not be so cruel as to blight my life and destroy the happiness of your daughter, could you?"

"Rather than have you for a son-in-law, I would willingly nail my daughter in a box and send her to a crematory. I give you fair warning. I don't want you to come around here again. Light out or I'll dust your coat-tail with bird shot."

"Who's that in the parlor with Jane?" the general asked of his wife several nights later.

"Young Jagle."

"What! is that scoundrel here again? Hand me that cane; I'll go in and maul him out of shape."

"Do not molest him, general. He is so devoted to Jane that I do not think he can keep away. Better let him marry, for it seems that nothing but death can break his admiration."

The general sat and mused. It was a struggle for him to refrain from striking the persistent fellow, but he wavered. A rainstorm came and beat against the house, and twisted the limbs of the great trees in the yard, but still the old general mused. A blinding flash and then a report that shook the house brought the old man to his feet. Rushing into the parlor he found the young man lying on the floor. The general raised him up. He opened his eyes and said:

"If you won't hit me again I'll leave here and never come back. I can travel now. Gimme my hat," and tearing himself loose, he ran away and came no more. Another evidence of "saved by electricity."—*Arkansas Traveler.*

Dinner to Dr. Norvin Green.

A SPEECH BY THE GUEST OF THE EVENING —THE FUTURE OF TELEGRAPHY — THE WESTERN UNION — THE CABLE COMPANIES.

LONDON, Aug. 3.—A dinner was given tonight in honor of Dr. Norvin Green, President of the Western Union Telegraph Company, by the chairman and directors of the Eastern Telegraph and the Eastern Telegraph Extension Companies, at the Star and Garter, Richmond. John Pender presided.

Dr. Green, replying to a toast, acknowledged the honor paid him and the hospitality he had received in England, and his indebtedness to Mr. Pender and the entire telegraph fraternity for constant attentions. He had seen something of city and country, had found the mother country kind and agreeable, and was loth to leave her. He everywhere saw culture, thrift, progress, power, and dominion of land and sea, but the sheet-anchor of strength was the latent wealth of the people and their money investments throughout the world.

* * * * *

THE TELEGRAPH IN ITS INFANCY.

The cable companies extending him this hospitality to-night could girdle the earth with the length of the cables they had laid. The Western Union Company had increased its plant five-fold, spanned a third of the earth, and had sufficient wire to girdle it fifteen times. In the meantime its capital stock had been increased only two-fold. With 75,000 miles of wire it was $41,000,000; with 425,000 miles it is $80,000,000. The market value of the shares was 40 to 60 per cent. They are better worth par now than 40 then. He believed that telegraphy was still in its infancy. Many very important uses had yet to come. As an interest-saving method it must be generally used for bankers' drafts and it must bring about more intimate commercial and speculative relations between the two countries. The hours of the exchanges in London and New York must conform, so that those bodies may be in session at the same time and connected by cable. This would result in vastly increased uses of the telegraph.

DR. GREEN'S FAREWELL WORDS.

There was, therefore, no property more secured and no enterprise more promising than the telegraph. Its necessity and usefulness must continue to increase in popular appreciation. Dr. Green continued as follows:

And now I come to bid you a grateful farewell. I have enjoyed much of your hospitality, and had many occasions to drink with you to the health of Her Majesty the Queen, which I have uniformly done with a hearty good will, for if you must have a Queen you certainly have one that Englishmen have a right to be proud of, as being honored and respected all over the world, alike for her wise and prudent rule, for her very exemplary court, and for her noble and generous benevolence. My criticism upon your form of government is not that you have a sovereign, but that you have only one. We have fifty millions of sovereigns in our country and are rather partial to them. The title may be less appreciated, because it is common to all, but you know we have no title below the rank of sovereign.

Still, it is rather remarkable that, with forms of government so essentially different, there should be so much similarity in the freedom of the citizen and in the protection of life and property. In these higher aims of government England and America and the Anglo-Saxon race everywhere march hand in hand. May they continue to co-operate in peace and amity till the English tongue shall become the court language in every civilized country, and these advanced principles of the English speaking peoples shall impress themselves everywhere.

After Dr. Green's reply, as given above, the "Star Spangled Banner" was sung, the company joining in the chorus. Lord Bury then proposed the toast, "The Eastern and Eastern Extension Telegraph Companies," to which Mr. Pender replied. Sir James Anderson then proposed toasts to "Our Guests," coupling therewith the name of Isaac J. Bailey, who made an amusing reply.

SOME OF THOSE PRESENT.

Among the invited guests, most of whom were present, were the following: Sir Thomas Wade A. Grant, M. P.; P. Rylands, M. P.; the Hon. Ashley Ponsonby, Dr. Webster, M. P.; the Hon. J. C. Dundas, M. P.; P. Macliver, M. P.; Dr. Farquharson, M. P.; Professor F. Jenkin, Mitchell Henry, M. P.; J. H. Puleston, M. P.; Sir E. Archibald, Sir. J. McG. Hogg, M. P.; Sir T. Brassey, M. P.; the Hon. A. de T. Egerton, M. P.; Sam Ward, Sir Charles Foster, M. P.; Admiral Inglefield, Captain Shaw, of the Fire Brigade; V. G. Probyn, Dr. Goodsall and C. H. Patey, of the General Post Office.

An Electrical Problem.

SEARCHING FOR A SYSTEM OF RUNNING WIRES UNDER GROUND.

It was stated Friday last at the office of the General Committee on Underground Communication, whose object is to devise and put in operation a system by which every house may be supplied on demand with every form of electrical connection without delay, undue cost or disturbance of the streets that the prospect for the realization of the desires of the committee was most excellent. Since the general meeting of the committee, which is made up of representatives from twenty-five electrical companies, a sub-committee has been organized for the purpose of examining electrical and mechanical devices as well as inventions now in use.

The committee will also consider and report to the general committee the state of the art, the difficulties that are surmountable, whether an ideal system cannot be perfected, and make recommendations as may seem worthy of adoption as providing a partial remedy for the difficulties encountered pending the invention and perfection of a satisfactory system.

This committee is composed of Henry Morton, of Stevens Institute, Chairman; Albert B. Chandler, President of the Fuller Electrical Company; Joseph P. Davis, Vice-President of the Metropolitan Telephone and Telegraph Company; Frederick H. May, General Manager of the American Rapid Company; Henry W. Pope, Vice-President of the Manhattan District Company; Garrett S. Mott, General Superintendent of the Bankers and Merchants' Telegraph Company; Elihu Thomson, Electrician of the Thomson-Houston Electric Company; J. Elliott Smith, Superintendent of the City Fire Department Telegraph; the Governor of the State and Mayor of the City, ex-officio, and William C. Behrens, Secretary.

Already 400 devices for overcoming the difficulties from induction and retardation arising from the placing of so many wires in an underground conduit, many of which require different conditions from each other, have been examined and the work is being carried on rapidly.

Circulars concerning the object of the committees were sent to the electricians and scientific men in this country, and many were sent abroad, over 300 going to England alone. They were also sent in large numbers to France and Germany, to both large electrical houses and to electricians. As a result many answers have been received, some of which contained valuable suggestions, while others gave complete systems for laying wires under ground without affecting one another.

There have also been patents applied for in this country of devices which are claimed to meet all the complex difficulties.

The committee have been greatly encouraged in their work, and state that many of the plans offered are of practical worth, and believe that a system of laying all the wires of the twenty-five companies represented on the general committee, as well as others, in a main, without injury to the working of any, will be found.

Meanwhile, the Committee on Law and Franchises are preparing a report, which will be presented soon after that of the Mechanical and Electrical Devices, after which the Committee on Business Organization will act.

Electric Lights in Springfield.

SPRINGFIELD, August 1, 1883.—An important negotiation took place at the Agawam Bank in this city, this afternoon, between the directors of the Weston Electric Light Company of Springfield and Edward H. Goff, president, and William A. Hovey, vice-president, of the American Electric and Illuminating Company of Boston. The result was an agreement by which the Weston company of Springfield sells out its entire plant, winds up its affairs, and goes out of business, while a new company, the Massachusetts Electric Light Company of Springfield, using the "American" or Thomson-Houston system, will take and carry on its business, substituting a greatly increased "American" plant for the Weston plant now in use. Among the directors of the Massachusetts company will be the Hon. H. S. Hyde, president of the Agawam National Bank; the Hon. Gideon Welles; ex-Mayor Lewis J. Powers, president of the Powers Paper Company, and C. A. Nichols, publisher.

In an article by Gordon Wigan, M. S. T. E. E., in the August *Magazine of Art*, comparing the arc and incandescent systems of lighting, for use in picture galleries, the writer says unhesitatingly that so far as the kind of light is concerned the arc system is really the best. He admits that most people have an illusion that the light from an arc lamp is hard, cold, ghastly, whereas he maintains that in truth it is not so, but of a pure white; "it cannot be distinguished from the light reflected from a white cloud in the north; the light of all others most liked by painters. After a few evenings spent in a building lighted by it the illusion disappears, and we are able to enjoy the delight of daylight by night." This agrees with our own experience.

In the *Monthly Record of American Art* of the same magazine it is stated that "The Essex Institute Art Exhibition at Salem, Mass., was lighted by electric light with good success. Three Thomson-Houston arc lights were used, and were found preferable to any of the other systems yet employed for exhibiting pictures, the light being very soft and quiet. Several photographs of the hall were taken under the electric light."

Telephonic.

Great Southern Telephone and Telegraph Company.

The big strike of the telegraphers now in progress and the consequent disarrangement of the telegraph service, will cause special attention to be given by the public to any organization or company that proposes to give them telegraph facilities. The company whose name heads this article, is quietly but surely extending its lines and increasing its facilities, so that at a very early day it may help to solve the telegraphic troubles now in progress, by giving the people a service offering more conveniences and advantages than the old system.

The Great Southern Telephone and Telegraph Company was formerly the Louisiana Telephone Company. Mr. W. W. Huck, the manager of the new company, was secretary and treasurer of the Louisiana Telephone Company, and is well known in Vicksburg, as he spent some time in our city when he established the Telephone Exchange here, with Mr. William Jackson in charge, which has given such universal satisfaction to our merchants and business men.

Mr. Huck was a stockholder in the old company, and also owns considerable stock in the new one, but his promotion to the responsible position of manager is due to the efficiency, energy, and capacity he exhibited while in the service of the Louisiana Company. Mr. Huck is only about thirty-six years old, and is a native and lifetime resident of New Orleans. We are glad to see him hold such an important position in a company which promises to give this section much-needed telegraph facilities. Mr. Huck will probably make a tour of inspection of the lines and service of the new company at an early day, and his many friends in Vicksburg will be glad to greet him and congratulate him on his promotion.

E. S. Babcock, Jr., is president; P. J. Marrs, vice-president and general manager, and W. W. Huck, manager, of the new company, which promises to extend its service all over the United States, and to become one of the leading institutions of the country.—*Vicksburg Post.*

Southern Telegraph Company.

This company has commenced to form its connections from Columbia, S. C., to the North and South. The poles were being laid along Main and Gervais streets the 10th inst. The office will be in the vacant room of the Carolina National Bank. The company is making rapid progress in its work of construction, and no doubt will receive ample encouragement for extending its lines as fast as they can be erected. They seem to be moving upon the idea "that the longest pole takes the persimmon," judging from the length of those lying on the streets.

Projecting a New Telegraph Company.

Articles of incorporation of the New England Telegraph Company were filed on Tuesday. Frank R. Lord, of Temple Court, one of the incorporators, said on Tuesday last, that the company proposed to run its wires underground, and that Daniel S. Robeson, who superintended the construction of the Mutual Union's lines, would build the lines of the new company. Mr. Robeson said, when asked about the company, that he was not ready to talk about it. According to the articles of incorporation, the new company's lines will run from a point near the Produce Exchange to various cities of this State and New England to a terminus in Bangor, Me.

Seventy-five telephones are now in successful operation in Mitchell, Texas, and new lines going up every day.

The Southwestern Telephone Company has bought the old United States telegraph line from Mitchell to Coleman, Texas.

The guarantee necessary for the telephone line between Waco and Dallas, Texas, has been raised, and the papers will be forwarded to the Southwestern Company. It is hoped to have the line up by the 15th of September or the 1st of October.

The telephone line is now completed from Castroville to Brackettsville, one hundred and thirty-five miles distant from San Antonio, Texas.

Superintendent White of the Southern Bell Company has established station at Wrightsville, N. C.

The fifth annual gathering of electrical people, under the auspices of Eugene F. Phillips, Esq., president of the American Electrical Works, begins on Saturday, Aug. 18th, at Providence, R. I. These clam bakes have become deservedly popular, and this one we learn promises to excel all others.

The committee of arrangements is about the same this year as last, namely: H. W. Lytle, now of Baltimore; J. W. Duxbury and W. H. Sawyer, Providence; John I. Sabine, San Francisco; R. K. Pearce, Philadelphia, and H. W. Pope, New York.

The Erie Telephone and Telegraph Company has purchased three hundred miles of the government wire in Texas. These wires have been connected and the balance will soon be ready for use. Upward of a thousand miles of additional wire will be put up before January. Not a mile of line has been built on which the tolls have not been guaranteed for five years. The orders in the Northwest are something like two hundred ahead, and applications have been received from six or seven towns in Texas, which the company is not ready to attend to yet.

Telegraphy and Mesmerism.

Forty-eight years ago Mr. Joel B. Sutherland, a member of Congress from Pennsylvania, introduced in the House of Representatives a resolution requesting the Secretary of the Treasury to report to the House the propriety of establishing a system of telegraph for the United States. The Secretary addressed a circular-letter of inquiry to many scientific and practical gentlemen in different sections of the country inviting their attention to the resolution of Congress. The results of this inquiry brought forth many useful and practical suggestions, and urged the necessity of a system of telegraph for public and private purposes. The idea of using electricity as a means of communication between parties many miles apart seemed ridiculous even to many learned statesmen at that time, and it was then characterized as a twin brother to mesmerism and millerism. In the House, when an appropriation of thirty thousand dollars was asked to enable Professor Morse to continue his experiment with the magnetic telegraph, it was moved to divide the amount between Professor Morse and a Mr. Fish, to enable the latter, who was an expert in mesmerism, to carry on his experiments in the mesmeric art. When it came to the attention of the Hon. Thomas H. Benton, in the United States Senate, he said: "I rejoice at the invention of the magnetic telegraph, and look forward to the time when it will be of great value to the business interests and commerce of the country, and do not doubt that the time will come when electricity will be extensively applied in the arts and commerce of the world."

The National Cable Railway Company.

The National Cable Railway Company, recently incorporated for applying the wire cable system, as operated in San Francisco and Chicago, to surface street railroads as a substitute for horse cars in all cities and villages of the United States, has completed its organization, with the following list of officers:

S. F. Pierson, the assistant pool commissioner of the trunk line railroads, President; Abraham L. Earle, ex-Deputy Comptroller, Secretary; General Egbert L. Viele, Commissioner of Parks, Consulting Engineer, and ex-Lieutenant-Governor Wm. Dorsheimer, Robert Sewell and Charles P. Shaw, counsel.

The company have purchased the Hallidie patents and retained George Harding and James R. Burnett to assist them as against infringers.

A pleasant visit from L. S. Allen, general manager of the Mexican Pacific Telephone Company, more than assures the success of the telephonic interests in that part of the Republic of Mexico. His territory covers four States—Sonora, Sinaloa, Tepic, Colima, and all of Lower California. By sincere, earnest work he has placed the company in an excellent condition in the territory. Mr. Allen left New York for his home in Mazatlan on last Wednesday.

A disastrous fire in Brockton, a few nights ago, consumed $35,000 worth of property. Twenty telephone wires running to Taunton, Fall River, New Bedford and other points were destroyed, and communication with Boston by telephone was also interrupted for several hours.

The report that the railroad telegraph operators in the employ of the Delaware, Lackawanna and Western Railroad, the Baltimore and Ohio Railroad, and the Chicago and Alton Railroad would quit work Monday morning last, in compliance with the order of the Executive Committee of the Brotherhood of Telegraphers, did not cause as much excitement among the telegraph operators who are now on strike or the officers of the railroads which would be directly affected by such a movement as might have been expected. For more than two weeks past a rumor has been in circulation that the railroad operators would be ordered out, and the effect of such a strike has been partly discounted.

REPLY OF PRESIDENT SLOAN.

Mr. Samuel Sloan, the president of the Delaware, Lackawanna and Western Railroad, sent the following reply to Messrs. O'Connor, Campbell, and Orr, the committee of the Telegraphers' Brotherhood, who on Saturday presented a "bill of grievances" on behalf of the railroad operators:

"DEL., LACK. AND WEST. RR. CO.,
"PRES'T'S OFFICE, 26 EXCHANGE PLACE,
"NEW YORK, August 6, 1883.

"SIRS,—Your letter of the 4th instant was left at my office on the day it was written. The peremptory tone of the 'requests' seems to imply consequences that I cannot fail to understand and appreciate, asking for a prompt reply and that the changes proposed must take effect at noon to-day.

"I am not aware that our operators are dissatisfied with their salaries or hours of labor; no demand, so far as I am informed, has been made for any change in either. Knowing as I do many of our operators, I hesitate to believe you fairly represent them all in your letter.

"Many, if not most of them, have been years in the service of the company; their pay increased and promotion made without solicitation.

"An operator has become our superintendent of our telegraph system. In all branches of the service ability and devotion to the interests of the company are recognized. The master mechanics of our shops have risen from firemen and engineers. The general superintendent of the company has risen from a brakeman. Men look forward to promotion, and are not disappointed.

"Having for more than thirty years been actively employed working hard as an executive officer, closely watching all these great interests, sympathizing in the varied changes of labor and capital, I feel the communication you have sent me a mistake on your part. I therefore promptly reply and decline to accede to your requests, stated in your letter referred to.

"Yours, &c.,
"SAMUEL SLOAN, President."

Mr. Sloan, in reply to questions by a reporter of the *Evening Post*, said: "I do not believe the men on our road will quit work. I have always endeavored to avert a strike whenever it has been possible to do so. The men on our road have not made any complaint, and we only have the letter from the Executive Committee of the Brotherhood to show that there is any feeling of dissatisfaction. My own opinion is that this is a game of 'bluff' on the part of the managers of this strike. I have been assured by the superintendent of the road that most of the men will refuse to quit work, even if ordered to do so by the Brotherhood; but even if this order should be obeyed it would not interfere with the running of trains, except, perhaps, to cause a little delay. We have arranged a schedule by which all trains can be run by a time-card and by signals. The telegraph is, of course, a great aid in the management of a railroad, as it is well to know where each train running on the road is at a certain hour, but we have managed the road heretofore without the telegraph operators, and can do so again, if necessary.

"Then, again, fully two-thirds of the operators employed by this road are under bonds, and it is not probable that they would forfeit these bonds simply to benefit other telegraph operators. I am opposed to strikes, and will always do everything that I can to avert one, and have done so in this case, and my own belief is that there will be no strike."

"Telephone receptions" are a late quirk at summer resorts. They are given by young ladies, who converse with admiring swells three miles off, and thus have all the fun of a lively chat without the disagreeable odor of cloves.

A good story is told of a certain Deacon S. of rather agnostic tendencies, who did not believe in special providences, and thus delivered himself in prayer while fighting with a bear:

"Lord, if thou canst not interfere in my favor, at least let us have an even chance. Don't help the bear."

Spurs and Telegraphy.

A staff officer met with a comical experience in Peekskill during the term of service of the Thirteenth Regiment. This particular officer rejoiced in the possession of a pair of riding boots. Walking up the hill from the depot early one morning, booted and spurred, he was accosted by an ancient resident of the village who was progressing leisurely in a vehicle that would have discounted Holmes' famous "One Hoss Shay," after this fashion:

"Mornin'. Warm to-day; ain't it?"

"Good morning. Yes, quite warm."

"Don't you find it purty hot up there on them poles?"

The interrogated wondered what "poles" had to do with the camp, but at a venture hazarded the reply:

"Yes; pretty hot."

"I thought so," chimed in the ancient. "I allus said it were awful hot top o' them poles fixin' wires and sich," adding with a chuckle as a gleam of triumph lit up his leatherhead parchment visage: "I knowed ye was a telegraph man soon as saw I ye with them sharp things on yer heels."

Every cloud has an electro-plate lining. The telegraph strike had one good effect. It made it possible to get a telegram from Wall street to Madison square in less than thirty-six hours. People found out that it might be sent by mail.

Verbatim copy of a letter from an Irishman to his son in Dublin:

DEAR SON: If you are well when this letter reaches you we are all well. By the bearer I send you my old brown coat get a 'new one" made out of it. Your mother sends unbeknowing to me £5. I hope you will not spend them foolishly; if you do, I just can tell you that you are a silly goose, and I remain your affectionate father.

P. S.—Your sister Sally wanted me to tell you to send her a shell comb, but as I forgot it this time, and the letter was already sealed, I will mention it in my next.

Telephone Consolidation.

THE REVISED TERMS UPON WHICH THE COMPANIES ARE TO BE UNITED.

LOWELL, Mass., Aug. 10.—The stockholders of the Boston and Northern Telephone Company, at a special meeting to-day, declared in favor of the proposed consolidation of the New England telephone companies. The stockholders of the Bay State, and of the Suburban Telephone Companies have taken similar action.

The Lowell telephone syndicate has issued the following summary of the consolidation agreement recently agreed upon, which differs materially from that previously published :

The American Bell Company to have $8,000,000 of the stock and 50 per cent. of any increase that may be made hereafter. They to waive dividends for three years for a sum not exceeding $60,000 the first year, $120,000 the second, and $180,000 the third, providing said sums are earned over the 6 per cent. dividend which is to be paid to the stock representing the property. One million dollars of the Bell stock will draw regular dividends the fourth year and $1,000,000 each succeeding year until all the stock comes in, in 11 years. They will also have surplus earnings above 6 per cent. after the third year not exceeding $180,000 until the ninth year. On the ninth year they will have surplus earnings not exceeding $12,000 and the tenth year surplus earnings not exceeding $60,000. For this the American Bell Company gives the new company perpetual license for all patents they now hold or may hereafter acquire. The earnings of the New Consolidated Company will exceed 7 per cent. on dividend-drawing capital today, and a quarterly dividend of 1½ per cent. will be paid, commencing October, 1883, for the three months dating from July. 1.

The companies included, with the amounts of capital and subscribers, are as follows: The National Bell, of Maine, with $1,350,000 capital and 4,000 subscribers ; the Boston and Northern, with $1,050,000 capital and 3,200 subscribers ; the Bay State, with $728,000 capital and 2,700 subscribers ; the Suburban, with $490,000 capital and 1,400 subscribers ; the Granite State, with $132,000 capital and 450 subscribers ; miscellaneous, $70,000 ; the Southern Massachusetts, with $711,000 capital and 1,700 subscribers ; the Providence, with $800,000 capital and 2,500 subscribers ; the Southern New England, Connecticut, and Inter-State, with $1,679,500 capital and 5,000 subscribers ; the American Bell Company, with $8,000,000 capital, and the Boston, with 2,200 subscribers. There is in the treasury $800,000 unissued stock and $200,000 cash, making a grand total of $16,000,000, with 26,150 subscribers. Of the subscribers, Lowell companies contribute 11,750, the Southern New England companies 9,200, and the American Bell Company, of Boston 2,200.

NEW BEDFORD, Mass., Aug. 10.—At a meeting of the Southern Mas achusetts Telephone Company, held to-day, it was unanimously voted to consolidate with the other companies in New England. The Board of Directors were authorized to take the necessary steps in that direction.

The Telephone Company's Northwestern and Southwestern Territory.

When the Lowell management bought the Northwestern franchise, there were three lines between Minneapolis and St. Paul. There are to-day thirteen, and five additional wires in process of erection. At Minneapolis, where a new system has been under construction for a few weeks, 102 orders for telephones had accumulated July 16, when everything was in readiness to resume business. The Erie Company has just acquired, by purchase at auction from the Government 500 miles of telegraph wires and poles, connecting towns in western Texas, at not over 25 per cent. of the first cost. Necessary repairs will be made, and the wire converted to immediate use. The Erie's July output promises to be nearly 600 instruments. Manager L. N. Downs started for Cleveland last week to make certain economic changes in the management of affairs there.

At the Telephone.

Hello-ello ! your charming voice
Thus strikes me every week,
The while you ask, in language choice,
With whom I wish to speak.
I do not even know your name ;
Or where you go, or whence you came,
Although I ever seek—
I know that you are "Number Four,"
But positively nothing more.

And when I wish to talk with Jones,
I find that, without fail,
I ever am, 'mid mutual groans,
Connected with the jail.
But never notice that, my dear,
For I would gladly wait a year
To hear your pretty tones ;
From any one 'twould be a bore,
Excepting you, O "Number Four."

I wish that I could see your face,
As you sit by your "phone ;"
I think it must be full of grace,
But judging by your tone.
Of course your age I do not know—
I think it's twenty-one or so ;
But that you would not own.
It may be forty-five or more,
For all I know, O "Number Four."

Well, I suppose we'll never meet ;
I hear, but wish to see ;
I would not know you on the street,
And you would not know me.
Thus ever was the human lot—
To be unknown, or else forgot—
But still we friends may be ;
Perhaps upon the Stygian shore—
In Charon's boat, O "Number Four."

—*Puck on Wheels.*

The Telephone Inventor.

PROF. A. G. BELL TALKS ON THE RECENT PATENT DECISION.

When Alexander Graham Bell was asked to say something about the recent decision of the examiner of interferences, he laughed and said he had just received it in 200 printed pages, and had not time to read it. He said generally that he was glad to see the beginning of the end of the telephone litigation. In conversation he said he was still pursuing his investigation in regard to electricity, reading and experimenting almost constantly. Incidentally he was preparing a catalogue of books, pamphlets, and even short articles on the subject, with a view to facilitate his own investigation and those of others. He had the titles of 40,000 such productions already. He did not begrudge the hard work involved. Knowledge of what has been done or said in this field would help every electrician very materially. After days of experiment, he sometimes, in fact often, found that a discovery which seemed absolutely new was only new to him. Prof. Bell predicts a great future for the telephone. It has been hindered by the opposition of the telegraph companies. Abroad it has been very generally adopted by the telegraph companies, especially on branch lines in the cities and at small offices in the country. In this way they can get along without telegraph operators at many of the offices whose receipts would not support operators, and they would not be so crippled in case of a strike as are our telegraph companies to-day. Still there are more than 500,000 telephones in use in the United States to-day, and the manufacturers cannot supply the demand.

Opposed to the strike: "I do wish these operators wouldn't strike and kick up such a muss," said Mr. Smiley, as he threw aside his paper; "I'm tired of it." "Why, it don't concern you in the least," said Hannah; "you never had but one telegram in your life, and that scared you most to death before you opened it." "I know it, but some of my friends might die and I wouldn't have the pleasure of hearing of it."—*Hartford Post.*

A Local Telephone Company Incorporated.

The Coeymans and Albany District Telephone Company filed a certificate of incorporation on August 4th with the county clerk. The general route shall be from a point in Coeymans village, at or near the Whitbeck House, thence through the towns of Coeymans, Bethlehem, New Scotland and Watervliet, and other places in Albany County, to the county line of Schenectady, and from thence through the county of Schenectady to the city of Schenectady; also, branch lines to any point in the said counties of Albany and Schenectady; also, a line commencing at some point in the village of Coeymans, and running thence through the towns of Coeymans and Bethlehem and the city of Albany, to the same central point in this city. The amount of capital stock shall be $510, divided into 51 shares of $10 each, with the privilege of increasing the said capital to the sum of $20,000. The main office is to be located in the village of Coeymans.

The genial manager of the Norwalk, Ct., exchange, Mr. Elmer N. Lee, is off on a cruise with the Neptune Club.

"Ma, the telimbraphers have struck !" 'The what, my child ?" "The telimbraphers, ma—the men in the telegraph offices, don't you know ?" "My daughter, I hope you may always be as careful in expressing yourself. Some day you may marry a telibrapher, my dear."

Munich Electrical Exposition.

(CONTINUED.)

Next to the entrance on the other side of the building, and near the space reserved for the electrical laboratories, was the exhibition of the principal German manufacturers comprising apparatus for use in teaching or for scientific research. Various historical apparatus come next with telephone stations for communicating with distant points, different forms of telephones, models of telephone offices, etc.

On the opposite side of the nave the central group was formed by Mr. Marcel Deprez, installation for the transportation of force, and the important experiments to which these new applications have given place. It was here especially that the great interest of the exhibition centered for the question of the realization of one of the greatest problems of modern industry,—the transportation of force to a distance by means of electricity and through an ordinary telegraph wire—was to be demonstrated.

In the evening, consequently, the attention of visitors was drawn to the cascade of nearly ten feet in height, which was kept in operation by the force transmitted from Miesbach, about thirty-six miles away.

This remarkable result since supplemented by the experiments on the Northern railroad and confirmed by the report of the Institute Commission, will mark an epoch in the history of electrical application, and we may safely say that the realization of the electrical transmission of force to a distance dates from the Munich Exposition.

Mr. Schuckert's exhibition for the transport of force through a copper conductor from a distance of about three miles only, was also to be seen at the center of the left part of the nave.

Turning around this group and beginning at the buffet, the way led along a gallery for dynamo machines which comprised different forms more or less resembling the Gramme or Siemens' machines, then came Plantes' apparatus, and Schulze's and Boettcher's secondary batteries.

Various kinds of lightning arresters and cables were also to be met with in this section, as well as several special installations of machines.

In giving an account of these various apparatus we shall describe the most important ones first—that is, the apparatus and installations set up for the investigating committees' use, and include also the laboratories which were so perfectly organized for facilitating measurements and rendering them applicable in the study of the powerful currents that are now employed in practice.

Proceeding in chronological order, we will then take up the historical apparatus and the different dynamo electrical machines exhibited. In addition to the well known forms we shall have to describe a number of modifications of those forms which are peculiar to German manufacturers, and which, as yet, have not been noticed in the scientific publications of France. The study of electric lamps, which is so closely connected with that of machines, will come next, furnishing us also with several special models which, although but little known in French practice, have nevertheless come into considerable use in Germany.

After the examination of machines and lamps, our attention will be directed to the accumulators that were on exhibition. At the Munich Exposition these auxiliaries to the machines were principally represented by Plante's exhibit, and by two new forms contributed by Schulze and Boettcher. Telegraphic and telephonic apparatus and electrical applications for railroads will form the following chapter, and the review terminates with a series of articles considering various other applications of electricity, such as signaling apparatus and electro-metallurgical and electro-medical appliances first, and then the apparatus intended either for scientific research or for the teaching of the science of electricity.

It is our intention also to give as far as possible the results of the experiments made by the examining committee with the different apparatus.

We shall thus have reviewed in a methodical manner the different objects which difficulties connected with the installation prevented from being placed so near each other as might have been desired, and this will enable us to see what the exposition has brought out that is really new, notwithstanding the fact that it was held so soon after the one at Paris.

The latter was certainly a great event, and the Palace of Industry that was at first thought much too large for the purpose was in reality well filled with electrical applications. Thousands of things that were unknown except from the cold descriptions to be found in books or periodicals, and which scarcely seemed to have any real existance, were there to be seen in full operation—machines transmitting force from one end of the Palace to the other, feeding various forms of lamps whose lights shone out with magical effect. Telegraph, telephone, and various other applications filled the visitor with astonishment. It scarcely seemed possible, therefore, after such a revelation, that any attempt would so soon be made to inaugurate another exhibition of similar character. Such, however, has not been the case. A long time will certainly elapse before there will be anything to equal the Paris Exposition, from the fact that it was the first electrical exposition, and that it united in a single collection a formidable array of inventions not previously brought together, and which, at most, had only figured in expositions of a general character. But in a new science, and one in full development like that of electricity, progress is so great that a year's interval between two expositions is quite sufficient for producing enough inventions to create a new interest in an exposition where one may again see with pleasure and profit apparatus already known.

Moreover, when two consecutive expositions take place in different countries, each one of them bears the impress of the region in which it is held. Many manufacturers who would not trouble themselves to send their wares to a distant city are, on the contrary, quite happy when the place of the exposition does not necessitate lengthy transportation.

It was because of these reasons that the Munich Electrical Exhibition proved successful, though coming, as it did, only a year after the one at Paris, and that it was a'so able to present such a very respectable number of novelties.

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We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

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Kindred Interests.

Many of our readers will be interested in the following summary of the copper industries of the world, which we take pleasure in quoting from the best authority on this subject, the *Engineering and Mining Journal*.

"In a quiet way, copper is the subject of considerable discussion in the trade, and there are many who are inclined to take a hopeful view of its future. It is argued by many that prices cannot go any lower, while the likelihood is that they will move upward. The situation is tolerably clear on this side of the Atlantic. We have shipped abroad, and are still shipping, large quantities of refined and crude copper and furnace material and ores, and have latterly begun to export largely also manufactured goods. At present prices here and abroad, this movement will continue unabated, and it may increase in volume should prices abroad harden. They are now under an artificial influence; a business firm which is well known as having been formerly an extensive speculator in tin having been holding the market for a long time. Should its movement prove successful, we may look forward to a hardening of prices here. But the trade must also face the possibility of a failure of the speculation alluded to; and, in that case, the future of our market would not be so bright. It might check our shipments and turn into home channels considerable quantities of metal, under which the market would find it hard to rally.

"So far as our production goes, it is undoubtedly heavier in almost every quarter than it has been. The lake mines are in the aggregate increasing their output, and, taken all in all, the Southwest, including Arizona and New Mexico, will be ahead of last year. The Northwest, Montana principally, is developing wonderfully, but the great bulk of the material produced there goes abroad. The weakest spot in our markets, the outside brands, are now showing comparatively more strength than lake, a proof that for the present the supplies available to our refiners are not by far as heavy as they used to be. Altogether, the situation here is good; but it is imperiled by whatever may happen in England, and there the future is not so well defined as it is here."

Improved Incandescent Lighting.

It is recorded of a certain well-known electrician that, upon being asked his opinion of secondary batteries, he replied: "They are fit for little else but bringing out man's latent talent for lying." This is funny, but is it true? Unless the managers of an electric company, which has been phenominally successful heretofore in its enterprises, are mistaken, there is at least one other use for secondary batteries, and that is for making the incandescent system of electric lighting at once practical and economical. The aforesaid company are now about to introduce the secondary battery of the Faure-Sellon-Volckmar type into a general system of incandescent lighting. It has, as far as we know, been used to a limited extent isolated, but in the new system it will act as an intermediary between the current as it comes through the wires from the generator and the lamps themselves. By this means the unsteadiness to which incandescent lighting has thus far been subjected, will be corrected. Again, as is well known, the steam-engine cannot always be relied upon to run at the same rate of speed and with the same smoothness, besides being subject to accidents. In the system which is about to be introduced, however, the electrical current coming from generators worked by steam, will be led into secondary batteries, and the lamps will be fed from that source. Thus neither an unsteady movement of the engine, nor its temporary stoppage will affect the lights.

If this system proves as successful upon a large scale as it has upon a somewhat limited one, there will be not a little weeping and wailing and gnashing of teeth For, as is well known, a rival company has, at large expense, been constructing a system, differing in many essential details, in the lower part of New York. Already, in a public interview, its inventor has acknowledged that the same efficiency could have been attained at one half the sum which this installation has already cost, but the company which is about to use secondary batteries declares substantially that they can obtain the same amount of light by the intervention of secondary batteries for a sum much less even than this.

If this is the case, and it has been by no means proved up to the present time, there will be great disappointment not only in the offices of a certain electric company of this city, but also among those scientific English gentlemen who are in the habit of getting their ideas, when they have any, from this side of the water.

There is, for instance, the Nottingham installation, which, though by no means completed, is well under way, with the materials all contracted for; a system like that of which we say, its prospects are somewhat dubious. Then there are several other similar installations on the direct wire communication system.

But whichever system of incandescent lighting wins, there is one thing that has of late become more and more clear, and that is that in the near future gas will, to a large extent, cease to be used as an illuminant.

The period of contest and denial over the question of the possibility of producing a light of low intensity by means of electricity that would be suitable for the general purposes of interior lighting, has about drawn to a close. It is now pretty generally conceded—what there has never been any reason for denying—that the known laws of electrical transmission interpose no bar to the successful solution of the problem, but that the difficulties in the way are solely of a practical kind, and it is further quite generally agreed, so says a good authority, that these practical problems have been for the most part solved and the question reduced down to one of cost simply.

A well-known authority, comparing the cost of electricity (incandescence system) with that of coal gas, says: "How far coal gas can go in a reduction of the cost of production it is difficult to say. Both cost of coals and prices of residuals are practically beyond the control of a gas company. The coal is already purchased in the open market, at the lowest figures at which it can be obtained, and the market for residuals depends chiefly upon the development of chemical industries, which can hardly be hastened by the action of a gas company. This market is a steadily growing one, and it is not impossible that the residuals will in time pay for the coal, though it is hardly probable. The items of labor and distribution cannot probably undergo any considerable reduction. The limit then, beyond which it does not appear that there is any probability of coal gas falling in this country, is forty-six cents per thousand, which is a figure that may be reached by electricity without assuming anything less probable than the above supposition respecting gas. It is only necessary to get ten lamps per horse-power and produce the latter with three pounds of coal an hour to bring the cost down to forty-seven cents, exclusive of the lamps."

Comparative Progress of Electricity and Steam.

Whatever may be said regarding the great advance recently made in electrical science, the candid will readily admit that the rate of progress made in electrical locomotion when compared with that made in steam has been very slow.

If proof were wanting of this it might easily be found in the publications of a half century ago.

In *The Penny Mechanic* of June 10, 1837, appeared the following:

"Mr. Thos. Davenport, a Vermont blacksmith, has discovered a mode of applying magnetic and electro-magnetic power, which we have good ground for believing will be of immense importance to the world."

Following this announcement is a reference to Prof. Silliman's "American Journal of Science and the Arts," for April, 1837, and abstracts from papers, of which the following is a specimen:

"1. We saw a small cylindrical battery, about 9" in length, 3" and 4" in diameter, produce a magnetic power of about 300 lbs., and which, therefore, we could not move with our utmost strength.

"2. We saw a small wheel (5½" diameter) performing more than 600 revolutions in a minute and lift a weight of 24 pounds 1 foot per minute from the power of a battery of still smaller dimensions.

"3. We saw a model of a locomotive-engine traveling on a circular railroad with immense velocity and rapidly ascending an inclined plane of far greater elevation than any hitherto ascended by steam-power. And these and various other experiments which we saw convinced us of the truth of the opinion expressed by Professors Silliman, Renwick and others that the power of machinery may be increased from this source beyond any assignable limit. It is computed by these learned men that a circular galvanic battery about 3 feet in diameter, with magnets of a proportionable surface, would produce at least 100-horse power, and, therefore, that two such batteries would be sufficient to propel ships of the largest class across the Atlantic. The only materials required to generate and continue this power for such a voyage would be a few thin sheets of copper and zinc and a few gallons of mineral water."

There are those who remember the first installment of the London and Northwestern Steam Railway and the circular magnetic railway near Birmingham. They say that, comparing that electric railway with those now being exhibited, and comparing the trip from Boxmoor to London with the present work of the London and Northwestern Railway they do not hesitate to affirm that the rate of progress in electro-locomotion during the last forty years has been far less than that of steam.

We believe in looking upon things as they are and not as we would like to have them, and following this policy we cannot look upon electro-motors as novelties and upon the electric light as in its infancy. The latter is, in fact, older than gas-lighting, for it was exhibited in Albermarle street, London, by Sir Humphrey Davy when London was yet lighted by oil lamps, and long before gas-lighting was attempted. The electric light exhibited by Sir Humphrey Davy consisted of two carbon pencils, between which and by the intensely vivid incandescence and combustion of the particles of carbon passing between the solid carbon electrodes, was the electric arc. The arc formed by the carbon pencils in this lamp was *four inches in length;* the pencils themselves being four inches apart, and as the present arc lamps rarely possess an arc of more than an eighth or a quarter of an inch, they are by no means so efficient.

But electrical lighting and locomotion have, it may be said, been lying dormant for many years, and the present revival of interest in both is sure, if we may judge from present successes, to produce results which will go far to compensate for the comparative inactivity of electrical science of the past half century.

We are pleased to learn from a letter from the efficient general manager, Mr. J. M. Wright, that the preparations for the Southern Exposition in Louisville, Ky., are in such a state of forwardness as to insure an exposition so complete as to satisfy the most exacting, and that applications for space are coming in so rapidly that it is becoming a serious problem how they shall be met. It is gratifying to know that the presence of representatives of the press of the country is properly appreciated, and that ample provision has been made for their accommodation. We take pleasure in acknowledging the receipt of a ticket of admission.

This exposition will, we feel sure, do much towards bringing the sections into homogeneous relations with one another. The means by which this will be accomplished will be not only by bringing the business men of the different sections in contact with one another, but much more by the exhibi-

tion of the capacities and resources of all parts of the country, to those of every other section whose capital and industry may be interested in their development. There are thousands of latent elements of wealth in every part of this Union, and particularly in the South and West, which it is only necessary to make known to the enterprising men of other sections to have fully brought into practical use.

These expositions ought therefore to have very beneficial effects, and should be attended by the enterprising people of every city and county in the Union. Large delegations of representative men and large exhibits of local productions will certainly be followed by good results to any locality that may have them present.

High-Resistance Insulators.

The Chicago Insulating Company has been for some time carrying on experiments upon insulators, and have tried every combination of materials and shape that theory and experience could suggest. Impressed with the importance of high insulation, they have not spared labor or expense, and their insulators show the result of original ideas and careful work.

Some of the patents owned by the company cover a new combination of materials from which they make knobs and insulators of great durability and resistance. To get an accurate idea of the value of this substance as an insulator, the company employed Lieut. Bradley A. Fiske, who conducted a series of crucial tests upon knobs and insulators furnished by them. Using a Thomson reflecting galvanometer, Mr. Fiske tested not only for insulation, but for porosity and hygroscopic qualities, but failed to get any deflection of the spot of light. At length forty of the company's knobs were joined in multiple arc, and forty porcelain knobs of the same size were similarly joined, the result of the trial showing absolutely the greater insulation of the company's knobs. As a final test, water was abundantly sprayed upon both, and the resistance of each set again measured. The non-hygroscopic nature of the new material now asserted its advantages, for the company's insulators showed a superiority of the porcelain ones of exactly 50 per cent. As porcelain is less hygroscopic than glass, their superiority over glass insulators would have been still more marked.

As, however, glass is preferred by some, the company furnish insulators of glass embodying other features covered by their patents.

They also manufacture knobs for electric light conductors in a variety of forms and sizes, and in any color, to match the interior decorations of a building.

Among other interesting things manufactured by the company is a fire-proof insulating tubing for electric light wires, for which they received a medal at the great Railway Exposition at Chicago.

The company has just brought to perfection a new idea in insulators, particularly applicable to long lines, or wherever else a high resistance is important, by means of which the resistance of each insulator is increased nine times. They are not yet ready, however, to furnish them in quantities, but are rapidly making arrangements for manufacturing them upon an extended scale. These they make either of their compound above mentioned, giving a glossy black insulator, or of glass, as preferred. They have already received the indorsement of high authorities; and if they sustain the claim made for them, they will make a new departure in insulation, the importance of which can scarcely be over-estimated. We are promised further particulars at an early day, which we shall be glad to lay before our readers.

"Subject to delay" is a thing of the past. That famous announcement no longer stands between the people and prompt telegraphy. At least it was removed from the Chicago and other offices at noon Saturday last. The great strike was some other strike.

Electrical Notes.

The French journals say that M. Mercadier has made important improvements in his Telera diophone which will make it an indispensable adjunct to telegraphy.

***

When, in working with the photophone, the ray of light striking upon the selenium receiver is eclipsed many times in a second, a continuous hum is produced, and this may be broken up into signals by varying the intervals between the intermissions so that a kind of Morse alphabet can be played upon the instrument.

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An arrangement for producing signals of this kind is attached to the transmitting instrument, when the signals are sent along the line to a telephone at the other end.

***

No gain over the ordinary telegraph is realized by such an arrangement, but by multiplying the number of transmitters at one end and the number of telephones at the other end, it can be made to admit of several different messages being sent along the same wire at a time and of sending messages at once from opposite ends of the wire without confusion.

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In order to give the multiple messages effect, it is only necessary to rotate the eclipsing wheels, which act upon the several selenium receivers at different speeds, so as to produce notes of different pitch in the receiving telephones and to fit each resonator so as to enhance a particular note.

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Then, although the complex current flows through all the telphones in turn, each telephone will only render to the ear of the clerk the particular note for which he listens, and the makes and brakes of that note will be the message.

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Scientific progress is now become so rapid that it would seem as though the time was not far distant when we should know all there was to be known.

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Professor Von Jolly has succeeded in weighing the earth.

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Singularly enough, the scales he used to accomplish this were very small.

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He placed a pair of scales in the top of a tower, and attached to each plate of the instrument a wire which reached, passing through a zinc tube, to twenty-one meters below.

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To the lower ends of the wires other scale plates were suspended, which thus hung within a little more than a meter from the ground.

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Under one of the plates he put a ball of lead a meter in diameter.

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The fact that a body at a certain elevation gains in weight as it is brought nearer to the ground, was verified by weighing bodies first in one of the upper balances, and then in one of the lower ones.

***

Furthermore, these bodies varied in weight in the lower plates according as the mass of lead remained under them or was taken away.

***

The differences in these weights showed the degree of attraction exercised by the mass.

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The value thus obtained, compared with the attraction exercised by the earth alone, furnished a means of ascertaining, according to the laws of gravitation, the ratio between the density of the earth and that of lead, and, the latter being known, of determining the mean density of the globe.

M. von Jolly's experiments give this density as 5 692, with a probable error of ±0.068, a figure that agrees quite well with other determinations, particularly with Bailey's of 5.67.

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When Mr. Siemens made his now celebrated remark in his presidential address to the Institution of Mechanical Engineers to the effect that the power of Niagara Falls would some day be distributed all over the State of New York, and even to a greater distance, he was looked upon as a dreamer.

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But what he proposed is growing day by day to look more practicable.

***

Let us look for a moment at the means devised by his friend, Sir William Thompson for carrying out the scheme, and later at the remarkable discovery recently made by M. Deprez, which greatly facilitate their efforts.

***

Sir William Thompson laid down the following rules to be observed in a possible undertaking.

***

Apply dynamos driven by Niagara to produce a difference of potential of 80,000 volts between a good earth connection and the near end of a solid copper wire of half an inch (1.27 centimeters) diameter and 300 statute miles (483 kilometers) length.

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Let resistance by driven dynamos doing work as by electric lights, or, as I can now say, by a Faure battery taken in a charge, be applied to keep the remote end at a potential differing by 64,000 volts from a good earth-plate there.

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The result will be a current of 240 webers through the wire taking energy from the Niagara end at the rate of 26,250 horsepower losing 5,250 or 20 per cent. of this by the generation and dissipation of heat through the conductor, and 21,000 horsepower or (eighty per cent. of the whole) on the recipients at the far end.

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The elevation of temperature above the surrounding atmosphere to allow the heat generated in it to escape by radiation and be carried away by convection is only about 20° centigrade; the wire being hung freely exposed to air like an ordinary telegraph wire supported on posts.

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The striking distance between flat metallic surfaces with difference of potentials of 80,000 volts (or 5,000 Daniell's) is (Thompson's "Electro-statics and Magnetism," § 340,) only 18 millimeters, and therefore there is no difficulty about the insulation.

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The cost of the copper wire reckoned at $185,000, and the interest at $9,500 per annum.

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If 5,250-horse power at the Niagara end cost more than $9,500 a year, it would be better economy, he said, to put more copper into the conductor; if less, less.

***

The one great difficulty he found in economizing the electrical transmitting power to great distances or even to moderate distances of a few kilometers was overcome, he thought, by Faure's invention.

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High potential, Thompson thought, was the essential for good dynamical economy in the electrical transmission of power.

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But what are we to do with 80,000 volts when we have them at the further end of the wire?

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Imagine a servant going to dust an electric lamp with 80,000 volts on one of its metals.

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Nothing above 200 volts ought ever to be admitted into a house or ship or into any other place where safeguards against accident cannot be made absolutely and forever trustworthy against all possibility of accident.

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In an electric workshop 80,000 volts is no more dangerous than a circular-saw.

***

Until he learned of Faure's invention, Thompson thought only of step-down dynamos, at a main receiving station, to take energy direct from the electric main with its 80,000 volts and supply it by secondary 200 volt dynamos or 100 volt dynamos through proper distributing wires to the houses and factories and shops, where it is to be used for electric lighting and sewing machines, and lathes and lifts, or whatever other mechanism wants driving power.

***

When Thompson heard of the Faure battery he felt that the transmission of a great power to a distance could be done much more economically, and certainly with greater simplicity and regularity, by keeping a Faure battery of 40,000 cells always being charged direct from the electric main and applying a methodical system of removing sets of fifty and placing them on the town supply circuits, while other sets of fifty are being regularly introduced into the great battery that is being changed, so as to keep its number always within fifty of the proper number, which would be about 40,000, if the potential at the emitting end of the main is 80,000 volts.

***

But since the time, now some four years since, when Mr. Siemen's prognostication made such an effect upon Sir William Thompson, and since the latter came to the conclusion that the Faure battery was all that was wanted to perfect the great scheme, other and far more important discoveries have been made.

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The Faure accumulator has been greatly improved by a combination with the Sellon and Volckmar adjuncts, but all this is nothing in comparison with the discovery made recently by Deprez in the transmission of power by electricity.

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The $185,000, which Sir William computed the copper main from Niagara to New York to be worth, would now be unnecessary, for Deprez has shown that a great copper main is not necessary in the electrical transmission of power, an ordinary iron wire being all that is required.

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Upon reviewing this question one cannot help pausing to reflect upon the foresight and the courage of Mr. Siemens, who boldly announced his views at a time when there was no known practicable means of carrying them out—views, too, which, had they been given by any man without the support of a successful career to maintain them, would assuredly been laughed at.

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Nor is it surprising that Sir William Thompson, taking up the project, gave it as his opinion that at no distant day it would be carried out.

***

From the time of Joule's experimental electro-magnetic engines developing ninety per cent. of the energy of a voltaic battery in the form of weights raised, and the theory of the electro-magnetic transmission of energy completed thirty years ago, on the foundation afforded by the train of experimental and theoretical investigations by which he established his dynamical equivalent of heat in mechanical, electric, electro-chemical, chemical, electro-magnetic and thermo-elastic phenomena, it had been known that potential energy from any available source can be transmitted electro-magnetically by means of an electric current through a wire and directed to raise weights at a distance, with unlimitedly perfect economy.

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The first large-scale practical application of electro-magnetic machines was proposed

by Holmes, in 1854, to produce the electric light for lighthouses, and persevered in by him till he proved the availability of his machine to the satisfaction of the Trinity House and the delight of Faraday in trials at Blackwall in April, 1857, and it was applied to light the South Foreland Lighthouse in December, 1858.

***

This gave the impulse to invention, by which the electro magnetic machine has been brought from the physical laboratory into the province of engineering, and has sent back to the realm of pure science a beautiful discovery, that of the fundamental principle of the dynamo, made triply and independently and as nearly as may be simultaneously in 1867 by Dr. Werner Siemens, S. A. Varley and Sir Charles Wheatstone.

***

This discovery constitutes an electro-magnetic analogue to the fundamental electro static principle of Nicholson's revolving doubler, resuscitated by Varley in his instrument "for generating electricity," patented in 1860; and by Holtz in his celebrated electric machine, and by Sir William Thompson in his "replemisher" for multiplying and maintaining charges in Leyden jars for heterostatic electro-meters, and in the electrifier for the siphon of Thompson's recorder for submarine cables.

The "West India Telegraph and Telephone Company," an American company are making the necessary preliminary movements looking towards the establishment of the American system of "exchange" connections in Kingston, Jamaica, which system means a "central office," with lines radiating therefrom and connecting with individual subscribers, by means of which one subscriber can converse with another without leaving his office or other place of business, or without the necessity of employing a messenger, with its attendant costs and delays. The above-mentioned company, on Friday last, placed a complete set of telephonic apparatus in the store of J. J. G. Lewis' model grocery, King street, connecting with a similar set at the store of G. C. H. Lewis, Port Royal street. While the telephonic communication will be of much service to the Messrs. Lewis in connection with their business, the main intention of the company is to place their apparatus before the public and demonstrate its convenience and advantage.

The merchants of Kingston, and others who may be interested in the matter, are invited to call at either of the above-mentioned places and examine the construction and working of the same. Any further information may be obtained from the assistant manager of the company, now resident in Kingston.

The electrical current: The craze on electrical study is beginning to bear fruit. "Are you the conductor?" asked a lad on an excursion train. "I am," replied the courteous official, "and my name is Wood." "Oh, that can't be," said the boy, "for wood is a non-conductor."—*Boston Bulletin.*

A System of Signaling Devised for the Brooklyn Bridge.

Assistant Bridge Superintendent Hoagland stood in the New York depot of the bridge yesterday and tapped the key of a telegraph instrument four times. At each tap a little hammer struck a small gong, ringing out a clear note. A moment later the gong resounded four answering notes. The apparatus will be used for the purpose of signaling between the termini of the bridge with regard to the running of the cars. It is about eight feet from the switch levers, so that the same man can attend to it and the switches. Near the instrument is a card on which is written: "1—stop, 2—start, 3—slow, 4—experiment." There are three instruments on the wire—one in each of the stations, and one in the room where the engineer has charge of the engines which run the cables.

Italian Telephone Company.

We have just received a communication on the condition of subscribers to June 30, 1883, from which we give the following interesting figures:

The exceptional development that the telephone industry has taken in Italy is remarkable. On June 30, 1882, the number of subscribers was 2,347. At the present time it is 4,786, or an increase of over 100 per cent. within a year. Considering its population, Italy therefore occupies in this respect the first rank in Europe.

We may also add that as the construction period is well advanced the company is about to enter a normal and regular working period which cannot be otherwise than profitable.

CITIES.	Population.	Number of subscribers on June 30, 1883.	Number of subscribers on June 30, 1882	Subscribers received during the year.	Average daily calls during the month of June, 1883.
Turin	252,832	570	357	213	1,500
Milan	321,889	520	274	246	2,000
Venice	132,826	185	104	81	900
Genoa	179,515	492	290	142	1,500
Saint Pierre d'Arena	22,158	74	31	43	100
Bologne	123,274	312	90	222	1,000
Florence	169,001	513	180	333	1,100
Livorno	97,610	231	87	144	600
Rome	300,467	939	438	501	2,500
Naples	493,115	525	276	249	1,800
Palermo	244,991	246	117	129	800
Messina	136,497	114	50	64	300
Catania	100,417	135	63	72	300
	2,564,522	4,786	2,347	2,439	14,200

A New Telephone Company.

The Chesapeake and Potomac Telephone Company has been formed by the consolidation (July 12) of the Telephone Exchange Company, which has hitherto operated the telephone exchanges in Baltimore and other cities and towns in the State of Maryland, with the National Capital Telephone Company of Washington.

The new company has a perpetual license from the American Bell Telephone Company of Boston upon favorable terms. Its capital is $2,650,000, of which the Baltimore Company represents about two-thirds. The property consists of the business and exchanges of the State of Maryland and of the District of Columbia. It begins business with over 6,000 telephones in use, and a large area of undeveloped territory. For the development of this territory there is $100,000 cash in the treasury.

The directors of the new company include William H. Forbes, President of the American Bell Telephone Company; A. G. Davis, President of the Baltimore Company; A. B. Proal, of Baltimore; H. D. Cooke and H. S. Cummings, of the old Washington Company, and Morris F. Tyler and H. P. Frost, of New Haven, Conn., of the Southern New England Telephone Company.

The officers are Messrs. Morris F. Tyler, President; A. G. Davis, Vice-President; H. D. Cooke, Treasurer; and Warren Choate, Secretary.

The new company takes immediate possession of the property and management. The Maryland Telephone Company was the first one organized in the State. It began with a capital of $50,000. There were but few subscribers when it started, and the receipts for the first month amounted to only $78. The company was in operation from 1879 to 1882, during which time its capital was increased to $200,000. In 1882 the name was changed to the Telephone Exchange Company, with a capital of $500,000.

Telegraph Companies United.

Hereafter the Bankers and Merchants' and the Southern Telegraph Companies are to operate as one system.

J. G. Case, the Secretary and Treasurer of the Bankers and Merchants', said that by a purchase of stock, which was completed last Friday night, the control of the Southern was secured by the other company. The lines of the Southern extend from Washington to a point near Charleston, S. C. In a short time the wires will reach Charleston and Savannah. The contract for their extension to New Orleans has been signed, and it is alleged that six new wires, with river cables, are to be strung between New York and Washington.

Wires will probably be run to Chicago at once.

It is expected by the parties interested that in 60 days the entire system will comprise 10,000 miles of wire. The recent issue of $300,000 of bonds by the Bankers and Merchants' have been taken at par, and the increase of $700,000 of the stock of the company, making $1,700,000 in all, it is asserted, is as good as placed.

Wm. W. Maris has resigned as President of the Bankers and Merchants', and has been succeeded by A. W. Dimock, the Vice-President. J. R. Hegeman takes the place of Mr. Dimock.

The officers of the Southern will for the present remain unchanged.

The Washburne & Moen Company have commenced suit against a hardware firm in Albert Lea for infringement of the barbed-fence wire patent, which is believed to be the beginning of a series of litigations in Minnesota similar to that which has occurred in Iowa.

The strike of the telegraphers has not interfered much with the telegraph business of this city, though messages are only received subject to the delays incident to the strike.—*Natchez Miss. Democrat.*

The Western Edison Light Company say the prospect is that a large number of Edison incandescent lights will be introduced by them in their territory of Illinois, Wisconsin, and Iowa, during the coming year. Several systems, for the general supply of Edison light, are about being introduced, notably at Davenport and Des Moines, Iowa, Appleton and Milwaukee, Wisconsin, and elsewhere. They work a force varying from fifty to one hundred men, according to the needs of the needs of the business. The company have introduced about ten thousand lights in their territory.

With the telegraph in the hands of the government such a state of things as has existed for the past week would never trouble us. Nor would we be in danger of having our business unsettled at any time by a monopoly that acknowledges allegiance neither to the government nor the people.—*Lancaster Inquirer.*

The Lesson of the Strike.

VIEWS OF THE CHICAGO "TIMES."

[Special dispatch to the *Mail and Express.*]

CHICAGO, Aug. 11.

I send you the following editorial from the *Times* of this morning: "Though the misguided victims of the speculating syndicate that set out a few weeks ago to get a corner on the telegraph operators are still whistling to keep up their courage, it is quite plain that those among them who have some sense are beginning to realize that the moral obligation of each to an irresponsible brotherhood is overborne by a superior moral obligation of each to himself and those who are lawfully dependent on him. At the command of an irresponsible junta he left an employment which, whether satisfactory or unsatisfactory, was more profitable than idleness. In return, what has the irresponsible junta done for him? It has not provided a better market for his services, has not given him employment at higher wages, has not furnished him any means of existence upon which he can depend. He obeyed its command to strike in the fond but foolish belief that he could depend upon its pretended power to reinstate him at higher pay and shorter time, but now he finds that the pretence of the irresponsible junta was a delusion and he must depend upon himself. This is the lesson of the strike. It is a wholesome lesson. If every disappointed striker shall learn it, comprehend it and apply it rightly, it will be worth more to him in the future than all he has lost by merging his individuality in a tribe and abdicating his judgment in favor of the commands of an irresponsible boss; if it shall teach him that the only sure dependence of the individual is himself and that self-dependence is the only road to success in this world or probably any other world, he will promptly lift himself out of any tribal or communal relation to any brotherhood, assert his freedom to exercise his own faculties under the guidance of his own judgment, attend with assiduity to his own affairs and not the affairs of others, and soon find himself on the highway to that respectable independence which all the tribes, communes and brotherhoods that ever have been set up on earth could never obtain for him. All labor brotherhoods, whatsoever the motive of their existence, are delusions, snares and humbugs, which the youth whom fate reserves for a bright manhood is particularly careful to avoid.

Mr. C. A. Brown's cutter, the Venture, which was matched with Mr. H. G. Peabody's centerboard sloop of the same name from Larchmont to Newport, reached Newport Saturday afternoon at 2 o'clock. The weather was rough and the winds adverse, and Mr. Peabody's Venture did not show up in Newport until the following day.

NEW PATENTS—ELECTRICAL—1883.

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JULY 31, 1883.

282,187 Automatic regulator for dynamo-electric machines; Franz S. Giel, Brooklyn, F. Y.

282,158 Apparatus for lighting cars by electricity; George D. Burton, New Ipswich, N. H.

282,447 Apparatus for measuring electric currents; Sebastian Ziani De Ferranti and Alfred Thompson, England.

282,459 Dynamo-electric machine; Edward R. Knowles, Brooklyn, N. Y.

282,227 Device for lighting petroleum or gas lamps; Paul Richter, Germany.

282,297 Dynamo-electric machines for printing telegraphs; Stephen D. Field, New York, N. Y.

282,294-5-6 Dynamo telegraphy; Stephen D. Field, New York, N. Y.

282,246 Electric bell pull; Frank J. Wall, Lawrence, Mass.

282,043 Electric lighting gas burner; A. L. Bogart, Jamaica, N. Y.

282,431 Electro therapeutic apparatus; Abiel W. K. Andrews, Binghamton, and Cyrus R. Teed, Syracuse, N. Y.

282,030 Incandescent electric lamp; Isaac Adams Jr., Boston, Mass.

282,317 Joint for electric light brackets; Chas. H. Hinds, New York, N. Y.

282,328 Joint for electric light; Chas. H. Hinds, New York, N. Y.

282,449 Lightning rod; Thos. H. Dodge, Worcester, Mass.

282,472 Manufacture of incandescent lamps; Alfred Swan, England.

282,287 Magneto-electric signaling apparatus; Thomas A. Edison, Menlo Park, N. J.

282,190 Ozone apparatus; Henry D. Hall, New York.

282,229-30 Railway electric signal apparatus; Charles A. Scott, Boston, Mass.

282,396 Secondary battery; Eli T. Starr, Philadelphia, Pa.

282,414 Secondary electric battery; Chas. J. Van Depoele, Chicago, Ill.

282,460 Incandescent electric lamp; Edward R. Knowles, Brooklyn, N. Y.

282,461 Electric arc lamp; Edward R. Knowles, Brooklyn, N. Y.

282,157 Electric lamp globe, George D. Burton, New Ipswich, N. H.

282,073 Electric ore separator; Herman Greve, St. Paul, Minn.

282,165 Electro-magnetic dispatch tube; Chas. A. Chever, New York.

Turin Exposition.

News from the Turin National Exhibition is highly satisfactory; the works are being carried on quickly, and all such steps taken as are calculated to increase the importance of the show. The electrical department will be international, the same as in the exhibitions in Paris in 1881; at Munich in 1882, and at Vienna this fall. Many States have already expressed their intention to take part at this exhibition. It is very likely, too, that an Electrical Congress will be held during the time the exhibition is open.

Why She Blushed.

A few nights ago a bashful and rather green young fellow invited a young lady to attend a dance with him in this city. The invitation was accepted, and the couple appeared at the house. After dancing for some time, "greeny" saw his partner sitting in one corner of the room all alone. Now was his chance; so he walked up to where the young lady was sitting and sat down beside her. All well so far; but the bashful fellow was at a loss for something to say. He fidgeted about considerably, and was sweating profusely. Finally, taking hold of his wilted collar, he commenced conversation thus: "It's powerful warm in this room; my shirt's wet as it can be; ain't yours?" His partner blushed and said nothing, but took another fellow's arm for the next dance.

A New Order.

"Waiter," he began, "you may bring me a spring chicken, a piece of lamb, a choice cut of—" He was interrupted by the appearance of a friend, who chatted with him for three or four minutes and then left. "Waiter, how far had I got?" asked the gentleman. "You were going to order a choice cut." "Ah! yes; I was then under the impression that the West was enjoying fine weather and the wheat was being harvested in nice shape. My friend says it has been raining every day for a fortnight, the harvest is delayed and wheat is being badly damaged. "Waiter!" "Yes, sir." "I'll make a new order based on a falling off of 13 per cent. in the crop. Bring me a dish of pork and beans and a glass of milk!"

The interference case, Keith *vs.* Brush—subject, secondary batteries for electric storage—recently decided by the Examiner of Interferences in the Patent Office, in favor of Brush, has been appealed to the Commissioner of Patents.

The case is not the one which is to determine the question of priority of invention of the practical storage battery of the present day, as that is between Keith, Brush, and Faure, and is now pending the taking of further testimony.

The present case involves the use of *cast lead* electrodes. The question has been decided upon presumed legal grounds, which will be tested before the higher tribunals.

The Lowell Syndicate has just purchased of the Palmer Wire Company sixteen hundred miles of their extra quality No. 12 galvanized steel wire.

Boston sections of the Eastern and Boston and Maine railroad companies are lighted by the American Electric and Illuminating Company, of Boston.

A trial of eighteen Armington & Sims engines by the American Electric and Illuminating Company, in various stations, has resulted so satisfactorily that an order has been given for seventy-five more, to be constructed as rapidly as possible. A letter from Mr. Armington, in England, announces the sale of the right to use the Armington & Sims engine in Great Britain, at the schedule price originally adopted by the foreign syndicate.

Manufacturing News.

The Harrison Boiler Works, Philadelphia, Pa., have been having tests made of their boiler by Professor Morton, of the Stevens Institute of Technology. In his preliminary report, Professor Morton informs the company that it can safely guarantee an evaporation of nine pounds of water into high-pressure steam for each pound of coal burned, and that under all conditions the steam is completely dry, showing a slight amount of superheat. In regard to capacity as compared with rated size, a 50 horse-power boiler developed (on a basis of thirty pounds of water) from 64 to 75 horse-power, varying with the kind of coal used. Neither of the coals used showed less than 16 per cent. refuse. The evaporation during the capacity tests above referred to was, per pound of coal, from 9.25 to 9.93 pounds, and per pound of combustible from 11.04 to 13.5 pounds of water. The feed water was heated to 212 degrees, and the pressure under which the water was evaporated was about 70 pounds per square inch. In a test with a blower, the 50 horse-power boiler developed 137 horse-power.

The outfit of new machinery for the new plate mill of the Springfield Iron Company, says the Illinois *State Journal*, consists of a Porter-Allen automatic cut-off engine, with a cylinder 44 by 48 inches, and a fly-wheel 27 feet in diameter, and weighing something over 30 tons. This engine is calculated to make over 100 revolutions per minute. Then comes the train of three high plate rolls, which are 31 and 20 inches in diameter and 110 inches long. They are furnished with massive housings, pinions, spindles and coupling boxes, and also with a pair of small steam engines, whose only office is to work the screws which raise and lower the rolls. Accompanying the rolls are two massive tilting tables, each 30 feet long, with driven rollers, which receive the steel as it comes from the furnace, and send it backward and forward through the rolls until the work on it is complete. The operation of these feeding tables is very complete as well as interesting. By their use, very heavy plates can be rolled, and with a very great saving of labor. When the plate is finished, it is to be pushed off the end of one of these tables endwise on to a cooling bed. This consists of a series of cast-irod boxes, filled with water to keep them cool, and furnished with loosely-fitting covers. The plates rest on these covers and become perfectly straight and smooth while cooling and before removal. This bed is over 40 feet long, and arranged to accommodate a very long plate. When the plates are cool, they are raked off this bed sidewise by hydraulic machinery on to a bed, where they can be allowed to accumulate if necessary. From this they are taken by a hydraulic crane, and either distributed on the floor preparatory to marking for shearing, or they are taken directly to the shears, to be trimmed and cut into shapes desired by the customors for whom they are intended. These shears are a curiosity. They weigh over 70 tons, are driven by an engine big enough to run a flouring mill, and will take off at a single bite a piece of steel 100 inches long and 1¼ inches thick. When the plate is sheared, another hydraulic crane takes it up and swings it on to the cars on which it is to be shipped, a railroad track having been laid directly into the new mill for that purpose.

The following concerns were the contractors for the different parts of the new plant: The Southwark Foundry and Machine Company, of Philadelphia, furnished the engine; the rolls and train were made by A. Garrison & Co., of Pittsburg. Mackintosh, Hemphill & Co., also of Pittsburg, furnished the feeding tables; and Morgan, Williams & Co., of Alliance, O., the cooling bed, cranes and shears.

The hospital at Lausanne has been entirely lighted with electricity.

The Waltham Watch Company is replacing the speaking-tubes through its buildings with telephones.

MANY MILES OF WIRE.—The Western Union Telegraph Company has 1,454 miles of poles in Connecticut with 8,096 miles of wire.

William A. Harris, the well-known builder of the Harris-Corliss engine, at Providence, R. I., is building a new blacksmith shop, 44x45 feet; also a storehouse, 170x40 feet.

The recent irregularities of the telegraph service have kept more than one man from going in among the sharks and getting ruined by futures; but there is no gratitude in this world.

The Rapid Telegraph Company were very considerate to raise the wages of employes 10 per cent. and raise the price of despatches from 200 to 300 per cent. This is what Uncle Remus calls being good to ourselves.

It has been stated that newspaper editors never "strike," but the assertion is not borne out by the facts. An editor once struck so hard that a wild-eyed man, with long hair and a long poem, went down stairs seven steps at a time and landed on his spinal column at the bottom.

The *Manufacturers' Gazette* says the Pawtucket Electric Light Company, of Pawtucket, R. I., has purchased an Armington & Sims engine. Quite true, esteemed contemporary. The Pawtucket people know what will make a successful plant—a good engine.

The highest pole ever erected here for either telegraph or telephone purposes was planted yesterday in front of Sheriff Hutchinson's office, to answer for telephone service. It stands sixty-four feet above the ground. It took a number of hours of hard labor to get it into position.

A bill will be introduced in the Legislature to-day authorizing the incorporation of the Tahanto Cotton Mill in Fisherville with a capital of $300,000. It is expected that ground will be broken within 30 days, and that the foundation of the mill will be completed before the coming winter. The structure will be of brick, and will be located at the "Borough" or Upper Falls on the Contoocook River, about ⅜ of a mile from the heart of the village. Employment will be given to 400 operatives. The number of spindles will be 17,500. Providence capital is largely interested.

BUSINESS NOTICES.

Bradley A. Fiske, Consulting Electrical Engineer, 59 Astor House. Advice to inventors, calculations, etc.

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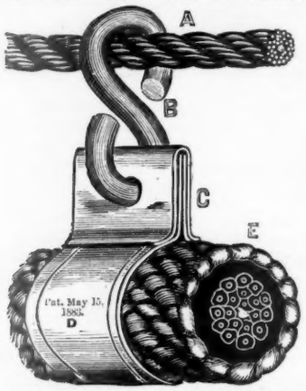

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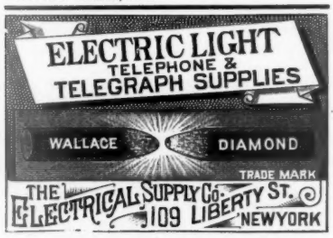

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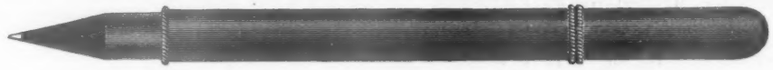

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The Commission of the International Electric Exhibition at Vienna, 1883, gives due notice to the public that this Exhibition is to take place in the course of this year, to be opened on the **1st August,** and to be closed on the **31st October,** and cordially invite Exhibitors and Visitors. The Regulations and the blanks necessary for Applications are to be had at the **Austrian-Hungarian Consuls.** The objects to be exposed will comprise all Machinery, Apparatuses and Implements connected with Electrotechnic It will certainly afford a good opportunity to inventors to show their latest improvements. This Exhibition is greatly favored by the Austrian Government, and will be held in the Rotunda of the well-remembered Universal Exhibition of 1873. Exhibitors are requested to procure the necessary papers at once.

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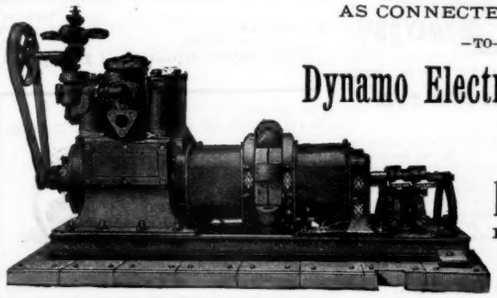

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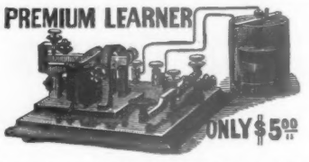

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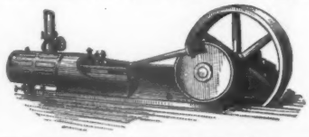

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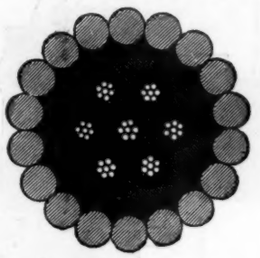

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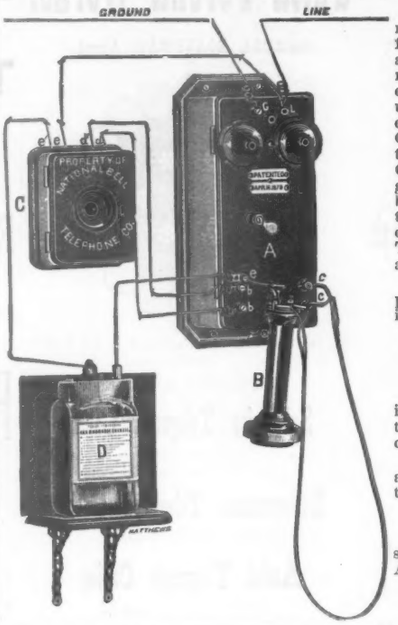

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